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GOOSEBERRY MILDEW.

(*Microsphæria grossulariæ.*)

During certain seasons, when a warm, moist spell of spring weather is followed by a sudden lowering of the temperature, the leaves of gooseberry bushes become more or less covered on both sides with delicate white patches of mildew, which soon appear powdery as if sprinkled with flour.

The fine powder consists of myriads of spores of the summer form of fruit of the fungus, which unless destroyed are blown about by wind and infect neighbouring bushes.

Later on in the season a second form of fruit, under the form of minute black points, just visible to the naked eye, appears on the mildewed patches. This second form of fruit ripens on the dead fallen leaves during the winter, and infects the young leaves in the following spring.

When the disease is severe the leaves die and fall quite early in the season, consequently the fruit is checked in growth and remains small, and if the epidemic occurs for two or three years in succession the bush becomes stunted in growth or may be killed outright.

The American gooseberry mildew (*Sphærotheca Mors-uvæ*) met with in considerable abundance in co. Antrim, Ireland, during the summer of 1900, is much more destructive than its European ally, as it attacks both foliage and fruit. It first appears under the form of delicate white patches, which

gradually become thick and felty and change to a dingy brown colour, and can be scraped off in flakes.

Prevention and Remedies.

Repeated experiments extending over many years have clearly proved that spraying with a solution of potassium sulphide, in the proportion of 1½lbs. of sulphide to 50 gallons of water, is the most effective remedy that can be applied. When the disease has previously existed the first spraying should be done when the leaf-buds are expanding, and continued at intervals of ten days or a fortnight as occasion demands.

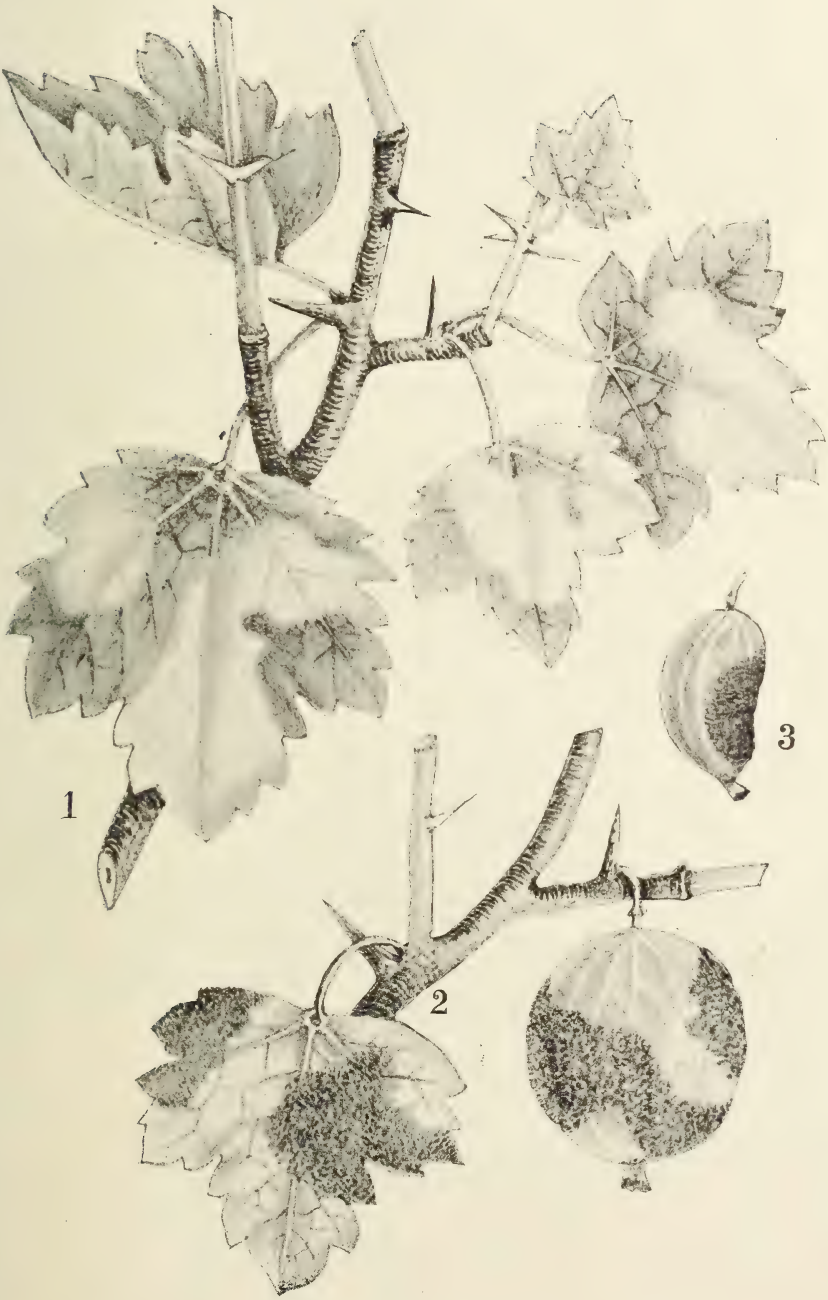
Bordeaux mixture must not be used after the fruit is set, and is not under any circumstances as effective as the potassium sulphide solution.

All dead fallen leaves should be collected and burned during the winter, and the ground under and around the bushes should be dug so as to bury any stray fungus fruit lying on the ground.

Description of the Figures.

1. Gooseberry Mildew.
2 and 3. American Gooseberry Mildew.*

* Copies of this article can be obtained free of charge and post free on application o the Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W. Letters of application so addressed need not be stamped.



GOOSEBERRY MILDEW.

THE HANDLING OF BRITISH WOOL FOR MARKET.

During the last twenty years a remarkable change has taken place in the conditions which govern the course of the British wool trade. In the early sixties light dress goods were the principal articles of British manufacture. It was desirable that the raw material for these should possess length and lustre. There was a great and continuous demand for such wools, lasting over many years, and it was freely said by dealers that our own country did not produce a sufficient supply of this article to meet the requirements the trade. In consequence of this idea great efforts were made on the part of such bodies as the Bradford Chamber of Commerce to induce the Colonies to grow long wool, and large numbers of stud sheep were sent out, especially to Australia, and crossed with merino sheep. The result has been a great importation of what is known as crossbred wool. Some notion of its influence can be obtained from the subjoined table, showing the imports, exports, and consumption of wool.

	Foreign and Colonial Wools.			Domestic Wools.			Total quantity retained in the United Kingdom.
	Total Imports.	Re-Exports.	Balance retained.	Total clip estimated.	Exports.	Balance retained.	
	Millions of lbs.			Millions of lbs.			Million lbs.
1855 -	98	29	69	135	16	119	188
1860 -	146	31	115	140	11	129	244
1865 -	209	82	127	150	9	141	268
1870 -	259	92	167	150	9	141	308
1875 -	361	172	189	162	11	151	340
1880 -	461	237	224	149	17	132	356
1885 -	501	267	234	136	23	113	357
1890 -	629	340	289	138	19	119	407
1895 -	771	404	367	135	22	113	480
1900 -	553	195	358	141	25	116	474

Of these totals it may be taken that crossbred wool of the United Kingdom amounted in 1900 to about 90,000,000 lbs., and Australian and River Plate Wool to 262,000,000 lbs., thus showing a competition of imported wool at the rate of nearly 3 to 1. These figures, for purposes of close comparison, are reduced to clean scoured wool.

From this it will be seen that within the memory of many living men the imports of wool from abroad were considerably less than our own growth. A glance at the figures for recent years will show that the total import amounts now to three or four times our own growth. The effect of this upon the course of the market is easy to imagine.

A great quantity of the wool imported from the colonies and from Buenos Ayres is of a type which will match the produce of almost every English breed. The merino has been crossed with Lincoln, Southdown, and Kent, and in the case of the River Plate large numbers of sheep are being produced annually without any cross whatever. It will be quite plain from this that growers of English wool have to face a vast amount of competition from which they were free a generation ago, and it is therefore of great importance, at this juncture, that producers should exercise the greatest possible care to maintain their product at least on an equality with the imported article, and that there should be no neglect on the part of the home wool grower in getting up his produce in good marketable condition. In former times it was one of the boasts of the wool dealers of this country that our own wool was got up for the market in a manner superior to that of any other country. Numerous Acts of Parliament were passed in order to arrive at this state of perfection, among them being 23 Henry VIII., cap 17, which enacted that " No person shall wind or cause to be wound in any fleece any wool not being sufficiently rivered or washed, nor wind nor cause to be wound within any fleece clay, lead, stones, sand, tails, deceitful locks, cot's, lamb's wool, nor any other deceitful thing whereby the fleece may be more weighty to the deceit and loss of the buyer." Sixpence per fleece only was the penalty under the above statute, but this was found an insufficient preventive, and therefore it was enacted

by 28 Geo. III., cap. 38, that "Every person offending as above shall, in lieu of every sixpence forfeit, pay two shillings for every fleece, and the whole thereof to go to the finder or prover of the said deceit, to be heard and determined by one or more magistrates in a summary way. Fleeces also bound up with cord, etc., or found wetted inside, are subject to the same penalty."

Although these Acts were repealed, as far as Great Britain was concerned, nearly forty years ago, along with some others which were obsolete, the habit of getting wool up in accordance with the law had become so common that the wool trade allowed these Acts to be abolished without any objection, and the practice of getting up wool remained the same as before the abolition of these Acts. It is probable, however, that the practice of leaving sheep unwashed may have given rise to some slipshod handling of wool in the past few years. It would be an unfortunate circumstance if the British wool grower should, at a moment when competition is keenest, depart from the honoured practices of his predecessors, on the ground that there has been a fall in prices. It is true that the large import of wool has brought down the price of the domestic article, but it would be a mistake to argue that because the price is low there is less necessity to pay attention to the getting up of home-grown wool to compete with imported varieties. The argument that because prices are low the article ought to be neglected and less care given to it is sufficient to produce a feeling of despair in the minds of those who are interested in the wool trade. It is like saying, "We have a very hard fight for our business: the tendency of prices is downwards, let us, therefore, deliver the article in a worse condition."

Mutton is now the dominant factor in the wool trade, and is not only transforming the short-wool flocks in the colonies into long wool, but is transforming our long-wool flocks at home into half-breds. Thus we have concentrated from two different points the influence of mutton in increasing a certain particular class of wool, a class of which probably three-fourths of the English clip is composed.

One of the greatest difficulties with which the British farmer has to contend in competition with the foreign and colonial importer is the ease with which business is done at the sales in London and Liverpool. A man can go to London and buy probably one or two months' supply of woo in a single day, whereas he might, when buying wool in the country, have to spend two or three weeks in purchasing the same quantity.

At Liverpool, for example, the last sale of River Plate wool amounted to 5,600 bales, most of which was the produce of flocks of pure English blood, or, at all events, the predominant feature was English blood. For the benefit of agriculturists it may be noted that this quantity is equal to more than 20,000 packs of English wool. It was classed into a variety of qualities to suit particular trades, and no buyer need have purchased a bale of wool of a kind which he did not want. The bulk was without strings and without straw, and was well skirted—that is to say, all low locks and dirty pieces were pulled off and packed into separate bales, which were offered separately in the auction.

This River Plate wool is bound to become a more active competitor with English wool every year, as will be understood from the fact that Argentina until recently bought from England every year from 4,000 to 7,000 stud sheep at a cost of £60,000 to £100,000. It is not easy to say what is the best means of enabling British trade to compete with the facilities offered for dealing in imported wool. It seems that our clips in England are not of a sufficient size to permit of sorting, but something might be done in order to save the time of the buyer in collecting sufficient for his requirements. In the South of England and also in Scotland a great deal of the wool is sold by auction, but in most parts of the country the trade is done by the old-fashioned method of bargaining, which seems more appropriate to dealing in horses than to dealing in a large commercial product. Something might be done by villages, districts, or counties combining together to hold a sale upon a certain fixed date, in which the seller would make up his mind either not to show his wool or to take the market price of the day, which it may be said that he

knows just as well as the wool merchant. It is, however, very difficult to persuade the farmer to leave his ancient practices. Many years ago the Corporation of Doncaster started a fair which was held every Saturday during June, July, and August. At that time there were from 400 to 1,000 sheets per week shown, principally of Lincoln wool. The railway companies and the Corporation of Doncaster provided every facility, but how was the fair regarded by the Lincolnshire farmer? Probably not 10 per cent. of the wool shown belonged to the grower. The bulk of the wool sold there was the property of jobbers and dealers who had gone round the country during the preceding week and bought it up.

The wool stapler, whether in Bradford or in the country districts, fulfils a useful function, for which the trade can afford to pay He understands wool and classes it to suit the requirements of the manufacturer, in a similar manner to that adopted by the Colonial and Argentine grader. But the man who is a mere dealer knows no more about wool than a farmer. He sells the article in the same condition as he got it. He takes his profit out of it for doing something which the farmers might do for themselves. Doncaster market, for example, is easily accessible to Lincolnshire farmers. Many men would go there to buy wool who are never seen among farmers, but who would prefer to deal with the grower for many reasons. They could afford to spend a day at Doncaster, but could not afford to spend a week at the farms over the same or a less quantity of wool.

It seems to me that auction sales conducted under the auspices of, say, a county agricultural society, where the selling authority should be treated as an arbitrator and stand between the seller and the buyer as a protection against any kind of unfair treatment of wool, is the ideal scheme for trading between the wool grower and the manufacturer. It cannot be expected that the present style of business can continue in face of the competition which exists and the desirability of reducing the amount of time spent over this business.

It should not be overlooked that the annual clip of home-

grown wool is still worth over £4,000,000 of money. The dealers in wool have no more influence over the price than they have over the weather, and it seems extraordinary that a commodity like this should be treated as if it were a bye-product when at the same time we are importing and using such large quantities of wool from abroad. Surely our own product should be worth a proper amount of consideration.

With regard to the practical points in the getting up of wool it should be observed :—

(1) That sheep should be washed without any artificial assistance—that is to say, they should be washed in cold water without any soap, except the natural soap which exudes from the skin in sufficient quantity at this time of the year.

(2) The sheep should not be allowed to run too long after washing before being clipped, as this in effect brings the wool back into greasy condition.

(3) Nor should they be clipped while wet, as this takes away the liveliness from the fibre and causes the wool to rot.

(4) They should not be clipped in dirty places, such as barns littered with chaff and straw and other matters which get into the staple and cause endless trouble and annoyance. The cost of this fault to the user is far more serious than growers think, as it is often impossible to get this foreign matter out without the use of chemicals.

(5) When the fleece is wound no earth or dung should be left on the fleece, or allowed to get in whilst winding.

(6) No locks, tailings, skin wool, black, or cots should be wrapped up inside fleeces, neither should greasy wool be wrapped up inside washed fleeces.

(7) The fleeces should be tied up with bands made by twisting a portion of the fleece itself. It is not necessary for these bands to be tightly twisted, the object being merely to keep one fleece separate from another. Strings composed of vegetable matter, such as hemp, jute, etc., are bad, and ought not to be used.

The most careful manipulation by the manufacturer often fails to detect small pieces of string, which do not make their appearance until the cloth is dyed, because the dyes which are required for wool will not do for vegetable matter.

Dress goods and cloth are often damaged in this way to a very considerable extent. Most farmers tie up their fleeces with wool bands, and have done so for generations, except in a few western and southern counties. In the latter the use of string, and frequently the worst kind of string, such as reaper or binder twine, is not uncommon. This use of string is unprofitable to all the parties concerned. The weight is such as to be inconsiderable to the farmer, while the amount of damage done is a very serious matter to the manufacturer. In recent catalogues of wool sold in Liverpool, on behalf of growers at the River Plate, great care is taken to advertise the fact wherever a lot is tied up without string, and this is one of the points which should show the British farmer how his foreign competitor bids against him.

J. W. TURNER.

THE "CANKER" FUNGUS

(*Nectria ditissima*).

The term "canker," as used by fruit growers, is applied to any disease of fruit trees, independent of its origin, where the bark becomes cracked and more or less destroyed. It is, however, very important that the true cause of the canker should be ascertained, otherwise preventive measures cannot be applied with any certainty of success, as the remedy most effective against one particular form of canker may prove useless against another kind of different origin.

The most frequent and at the same time most destructive form of canker attacking apple-trees in this country is caused by a minute fungus (*Nectria ditissima*), and as the general appearance of the wounds produced is very well marked no difficulty should be experienced in recognising this particular form.

The fungus can only gain admission to the living portion of a branch through a wound, being unable to pierce the unbroken bark. In the case of slender branches the wounds may be caused by frost, hail, or the punctures of insects. Having once gained an entrance the fungus spreads rapidly in the living bark, which becomes eaten away in irregularly shaped patches, leaving the wood exposed. In some cases the wound is confined to one side of the branch, but in many instances the bark is completely destroyed all round the branch, when the portion above the wound is at once killed. In very young branches the wood is also frequently destroyed, as shown in Fig. 1. A very characteristic feature of the disease, when attacking young branches, is the thick rugged mass of bark which forms round the edge of the wound.

On older parts of the tree canker usually first appears in the fork of a branch, access being gained by the fungus

through a crack caused by the overweighting of the branch with leaves or fruit. In this case deep, more or less curved, cracks first appear in the bark, which is finally destroyed, leaving irregular patches of naked wood. After becoming well established the fungus travels up the branch in the bark and bursts through to the surface at different points along its course, and by this means the branch is eventually killed.

In addition to the symptoms described for the recognition of true canker, the fungus itself may be found if carefully looked for. During the wane of summer patches of minute white specks may be seen nestling in crevices of the rugged bark surrounding the wounds: these are the first form of fruit produced by the fungus. In the spring these white patches produce a second form of fruit, consisting of very minute bright-red balls. A magnifying glass, which can be purchased for a shilling, greatly assists in detecting these minute bodies, the presence of which settles all doubt as to the cause of the disease.

During the winter months, when the characteristic white fluff has disappeared, the swellings and wounds caused by the American Blight (*Schizoneura lanigera*) somewhat resemble the wounds made by the canker fungus, but careful observation will reveal the presence of the Blight insect in the cracks.

Some kinds of apple-tree are more susceptible to the attack of the canker fungus than others. Those which yield some of the best eating apples are most liable to it. Cox's orange pippin is a variety subject to this disease, as are also the ribston pippin, the golden pippin, and several of the rennets or reinettes, notably Reinette des Carmes. Trees with the thinnest and smoothest bark are most liable.

Pear, plum, oak, beech, ash, hazel, alder, maple, and lime trees are also attacked by the canker fungus.

Prevention and Remedies.

Young branches that are attacked should be cut off, as they are certain to be girdled and killed at an early date.

When thick branches are diseased all the wounded parts should be cut away, and the cut surface luted with clay or

protected with a coat of gas-tar. If the disease has spread from the original point of infection, and appeared at the surface in other places, the branch should be cut off.

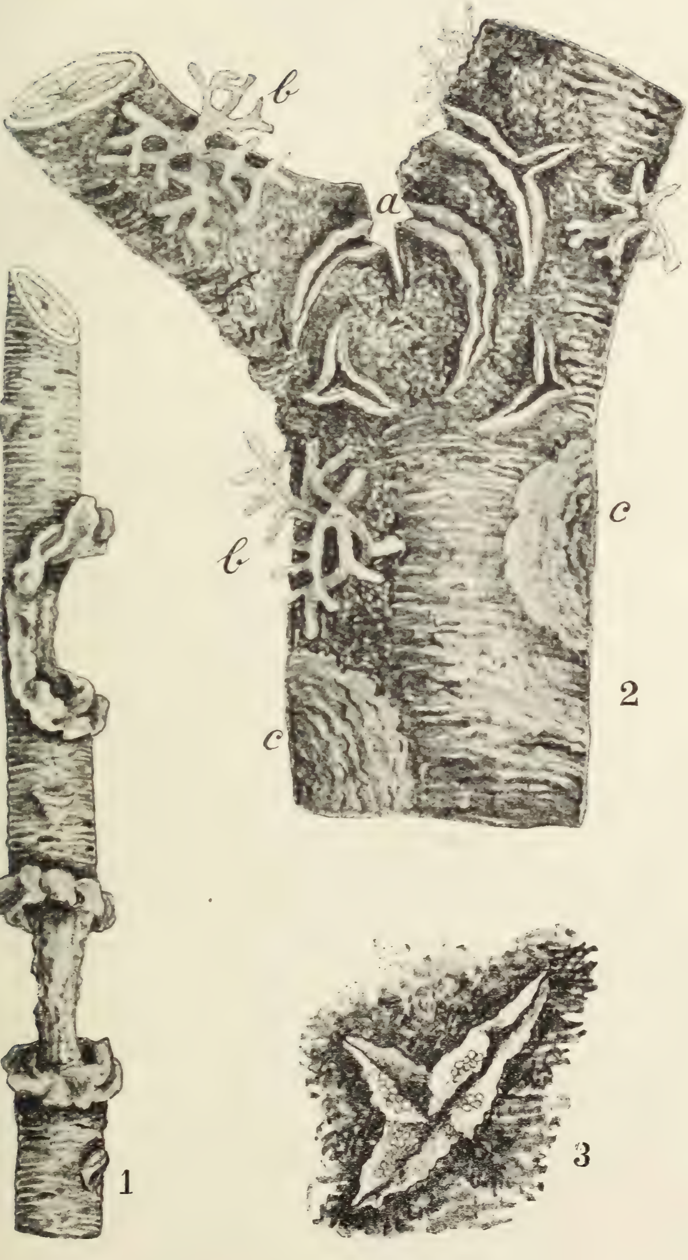
It is very important that grafts should not be taken from diseased trees, as parts that appear to be sound may contain the fungus in their tissues.

The white stage of the fungus can be killed by applying with a brush a solution of sulphate of iron—1 lb. to a gallon of water. This mixture will also destroy lichens and moss growing on the trunk and branches.

Description of the Figures.

1. A young branch of apple-tree badly attacked by the canker fungus.
2. A stout branch of an apple-tree attacked by the canker fungus. The fungus gained an entrance through the crack at *a*, and caused the curved cracks in the bark. At *b* and *c* lichens are growing on the bark.
3. A crack in the bark caused by the canker fungus. The groups of fungus fruit are seen springing from the sides of the wounds.*

* Copies of this article may be obtained free of charge and post free on application to the Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W. Letters of application so addressed need not be stamped.



"CANKER" FUNGUS.

FEEDING EXPERIMENTS WITH SHEEP.

On the Northumberland County Demonstration Farm at Cockle Park some sheep-feeding experiments were carried out during the past year, under the direction of the Agricultural Department of the Durham College of Science, to determine the influence of manures on the feeding value of swedes and seeds hay respectively. These experiments were not designed with the object of contrasting merely the feeding value of swedes and hay, but a comparison of the results obtained in this respect may be instructive and useful. The sheep whose rations are to be compared consisted of two lots of 40 and 20 head respectively, all of which were fed under cover at the same time, and, except for the diet, under identical conditions. They were of the same size and age, the shearlings were of the same breed, and, although the hoggs were not, they were reared on the same ground and were quite similar in quality.

The sheep of Lot I., after a period of eight weeks' preliminary feeding, were allowed at first nothing but swedes, of which they were given as many as they would eat, and were found to consume about 15 lbs. per head daily. The sheep of Lot II. received 8 lbs. of swedes daily and as much clover hay as they would eat, and they consumed of the latter food rather more than 1$\frac{5}{7}$ lbs. per head per day. After five weeks of this feeding a more liberal dietary was resorted to, and during the next six weeks the sheep on the "swede" rations received $\frac{1}{4}$ lb. meadow hay and $\frac{1}{4}$ lb. decorticated cotton cake daily in addition to the swedes, of which the consumption per head went up to about 16 lbs. per day, while those on the "hay" were given a substituted ration of 1 lb. clover hay, 10 lbs. swedes, $\frac{1}{4}$ lb. decorticated cotton cake, and $\frac{1}{4}$ lb. maize meal

The average live-weight gains and profits of the two lots are shown below.

—	1st Period, 5 weeks.	2nd Period, 6 weeks.	Total, 11 weeks.	Average Profit in 11 weeks.
	lbs.	lbs.	lbs.	s. d.
Average live-weight gain per head of 40 sheep in Lot I. - - -	6·25	10·77	17·02	2 7½
Average live-weight gain per head of 20 sheep in Lot II. - - -	1·64	10·70	12·34	0 0¾

One result brought out by the experiment is the value of the swede as food for sheep under cover. Sheep fed in the house for a period of thirty-five days were allowed as many swedes as they would eat; they consumed about 15 lbs. per head per day. They gained 6·25 lbs. per head upon this diet, although it contained less nutriment than is usually assumed to be necessary for maintenance. Twenty similar sheep fed in the same house and for the same period were allowed 8 lbs. swedes per day and as much seeds hay as they would eat. They gained only 1·64 lbs. per head in thirty-five days, although the diet, from a chemical standpoint, was more liberal than the other. This result is explained by the fact that it takes more digestible food to supply the animals' needs when the food is presented in a form difficult to digest —as in hay—than when in a form easy to digest, as in swedes.

In the second period of six weeks the diets fed to the sheep were more liberal, and at the same time more similar, the animals in Lot I. getting some dry food, and those in Lot II. receiving less hay and more roots. Assuming the foods used to have been of ordinary digestibility, both lots received almost the same amounts of digestible albuminoids and "starch equivalents." In both cases the supply was ample, and upon the new fare the sheep did about equally well. As the animals were now on a full diet, there was no longer a possibility of swedes proving superior, as they did in the first period of the experiment.

In his comments on the results of these experiments, Mr Middleton points out that they throw some further light on the very different estimates put upon the feeding value of swedes by different authorities. "When contrasted with drier foods, their chemical composition gives them a very low place, a place which no North Country man accustomed to feed cattle under cover assigns to them. The different estimates placed upon their value are usually ascribed to a variation in the composition of turnips grown in different parts of the country. This is partly the reason, but there are two others, the first of which has biassed the opinion of the practical and the second that of the 'theoretical' feeder. These reasons are: (1) Because a watery food like the swede can only give the highest results of which it is capable when the animal is warm and sheltered; (2) because, although the digestible food contained in swedes is worth more, at any rate when used for house-feeding, than the digestible food contained in hay and straw, this fact has not been generally recognised. The feeder wishes the fattening animal to do the minimum amount of work, and for his purpose the digestible matter of the swede would always have a higher value than the same quantity of digestible matter in hay, were it not for the large amount of water contained in the former. This decreases the value of the root crop as a food for animals exposed to cold and wet."

Another interesting experiment in sheep-feeding described in the Report of the Agricultural Department of the Durham College of Science was conducted by Mr. Lawrence at the Cumberland County Council Farm in continuation of somewhat similar experiments in previous years. On October 23rd, 60 half-bred Border Leicester and Cheviot lambs in good condition were divided into three equal lots. Twenty were penned on yellow turnips, and received in addition to the turnips ½lb. of linseed cake and ¼lb. of oats per head per day with hay *ad lib.*; another 20 were placed on grass, where they received the same allowance of cake, corn, hay, and turnips, carted to them. The third 20 were penned on turnips and received hay, but no cake and corn. At the end of seven weeks Lot 3 was allowed the same

C 2

quantity of cake and corn as Lots 1 and 2. At the end of another three weeks the experiment with regard to Lots 1 and 2 was concluded, but Lot 3 was now taken off the turnip land and placed on grass for three weeks, receiving cake, corn, hay, and turnips as Lot 2 had done. The whole period was a very wet one, and the land a clay loam—conditions as unfavourable for turnip feeding on turnip land as they could well be. Lot 1, however, showed itself decidedly superior to Lot 2, which received the same foods on sound grass land, as Lot 1 gained rather over $1\frac{1}{2}$lb. per head per week, while Lot 2 gained rather over $1\frac{1}{4}$lb. Lot 3, while receiving hay only, on the turnips, gained very little over $\frac{1}{2}$lb. per head per week, and failed to pay for their keep. That this was not in any way due to the sheep is shown by the fact that, as soon as they received corn and cake in addition, they too gained a trifle over $1\frac{1}{2}$lb. per head per week, but fell back to a fraction over 1lb. when supplied with turnips on grass.

In this experiment it is to be noted that three different lots of sheep fed in three different ways, and the same lot of sheep fed in three ways, yielded similar results. In 1899 similar sheep were kept on grass with the same allowance of cake, corn, and hay, but no turnips: these sheep made no gain at all; in fact, they lost weight slightly.

The conclusions which it is thought may be drawn from these experiments are that, over and above manurial values, it pays well to feed sheep on turnips with cake, corn, and hay; that sheep pay better when penned on turnip land, in spite of a muddy lair, than when receiving their turnips on grass land; that it does not pay to winter fattening hoggs on pasture land with cake, corn, and hay without turnips as they wander about too much in search of food; and that in wet weather the progress of sheep on turnips with hay alone is too slow to be profitable.

INSECTICIDES.

Under the heading "Important Insecticides," the United States Department of Agriculture have issued a Farmer's Bulletin (No. 127) dealing with some of the more useful remedies employed in America against injurious insects. Many of the pests on the other side of the Atlantic are not unlike those injuring crops and fruit in this country, and thus the measures adopted there may sometimes be advantageously tried here, so that a short summary of the information given in the Bulletin, with notes on the experience gained in this country with similar remedies, may not be without interest.

For the intelligent and practical employment of insecticides it is necessary to understand the nature and method of the injury commonly due to insects. Omitting the many special cases of injury which necessitate peculiar methods of treatment, the great mass of the harm to growing plants from these attacks falls under two principal heads—viz., that caused by biting and that caused by sucking, each group requiring a special system of treatment.

The biting and gnawing insects are those which actually masticate and swallow some portion of the solid substance of the plant, as the wood, bark, leaves, flowers, or fruit. They include the majority of the injurious larvæ, many beetles, etc.

For these insects direct poisons, such as the arsenicals, which may be safely applied to the leaves or other parts of the plant attacked, and which will be swallowed by the insect with its food, will furnish the surest and simplest remedy. They must, of course, not be employed when the parts treated are themselves shortly to be used for the food of other animals or of man.

The sucking insects are those which injure plants by the gradual extraction of the juices, either from the bark, leaves

or fruit; they include plant-lice or aphides, scale insects, thrips, and plant-feeding mites. These insects possess, instead of biting jaws, sucking beaks, which are thrust down through the outer layers of the bark or leaves into the soft, succulent tissues beneath, and used to extract the plant juices; with a resulting injury not so noticeable as in the first group, but not less serious.

For this class of insects the application of poisons, which penetrate little, if at all, into the plant cells, is of trifling value; and it is necessary to use substances which will act externally on the bodies of these insects, either as a caustic, or to smother or stifle them by closing their breathing pores, or to fill the air about them with poisonous fumes. Various deterrent or obnoxious substances are also of value as repellents. Whenever it is desirable not to use poisons for biting insects, some of the means just enumerated will often be available for these also.

Besides these two large groups of insects, insecticides can be used for those working beneath the soil, or subterranean insects; and for those attacking stored products, such as various grain or flour pests. Other groups, including species which require other methods of treatment, and for which insecticides are not usually of much avail, are: internal feeders, such as wood, bark, and stem borers, leaf miners, gall insects, etc., household pests, and internal animal parasites.

For combating the external biting insects the use of arsenical compounds has in America, it is stated, practically supplanted all other substances. The two arsenicals in most common use are Paris green and London purple, while Scheele's green and arsenate of lead are also used to some extent. Hellebore (another poison) is sometimes used in the form of powder, instead of arsenicals, when small quantities only are required; it is stated to be particularly effective against the larvæ of sawflies. In Great Britain it is used as a wash.

The most usual method of employing arsenicals is by spraying the plants which require treatment with a mixture of the poison with water. Paris green and London purple are used in America at the rate of 1 lb. to 100—250 gallons of

water, or 1 oz. to 6—15 gallons. The stronger mixtures may be used when the plant has vigorous foliage, while the more diluted mixtures should be employed when the foliage is tender. For general purposes, such as spraying apple-trees, 1 lb. to 150 gallons of water is a common average in the United States. In Great Britain 1 lb. to 250 gallons of water is found sufficient, with the addition of a little lime and soft soap. The poison is first made into a thin paste with a small quantity of water, and quicklime (in amount equal to the poison) added, in order to lessen the danger of scalding. The use of the lime is especially desirable in the case of the tender-leaved plants, which are easily scalded, and it is always better to use it with London purple. Paris green is best used in Great Britain in the form of Blundell's paste.

For leaf-feeding insects generally the spraying should be done at the earliest indication of injury, and repeated as often as necessary. In the case of the codling moth, usually combated by this method in America, the first spraying is done as soon as the blossoms fall, and is followed by a second application a week later. This treatment is of little use in this country, owing to there being a difference in the life history here and in America.

Care must be exercised in the use of arsenicals, as they are very poisonous. American experience shows, however, that if ordinary precautions are taken there is no danger attending their application. As regards their effect on the fruit, the poison, generally speaking, disappears almost completely from the plants in from 20 to 25 days (this depends largely on the weather), and it is stated that, owing to the great degree of dilution, the amount of arsenic on any single fruit, even shortly after the application, is so small that impossible quantities would have to be consumed to cause harm. Professor Riley has calculated, for instance, that it would take several barrels of apples at a single sitting to make a poisonous dose. Nevertheless, to avoid all risk of danger, plants should not be sprayed with arsenicals shortly before the produce is ready to be eaten. It is also stated that fruit trees should not be sprayed when in full bloom, on account of the liability of poisoning honey bees or other insects useful

as cross-fertilisers. The petals of the blossoms are also damaged by arsenites. In such cases, where it is undesirable to use arsenicals, recourse may be had to the remedies employed against other insects; although these are not generally so effective against the biting insects as the direct poisons, when the season permits of the safe application of the latter.

Against external sucking insects, "contact" poisons, and substances which render their surroundings disagreeable, are the chief methods in use.

Any good soap is effective in destroying soft-bodied insects, such as aphides. The soaps made of fish oil and sold as whale-oil soaps are often especially valuable, but variable in composition and merits. A soap made with caustic potash rather than caustic soda is recommended, as it yields a liquid in dilution more readily sprayed and more effective against insects. For plant-lice and delicate larvæ, a strength obtained by dissolving half a pound of soap in a gallon of water has been found sufficient.

Pyrethrum powder acts externally on insects through their breathing pores, and is fatal to many forms both of biting and sucking insects, but is not poisonous to man or the higher animals. Its chief use is against household pests and in greenhouses and small gardens, where the use of arsenical poisons is not advisable. It is usually applied as a powder, preferably in the evening so as to be retained by the dew.

Flowers of sulphur is used against many plant mites, such as the red spider; chiefly in the form of a powder when the foliage is damp. Sulphur is most successfully applied as a wash combined with paraffin emulsion. Liver of sulphur is the best form to use.

The standard remedies against aphides and scales are, however, emulsions of kerosene or petroleum oil with soap. The crude oils are said to be valuable against many pests, but the greater safety of the emulsions has resulted in the general adoption of these latter, as the pure oil, especially if carelessly used, may result in serious injury to the trees. The following are the proportions recommended for the kerosene emulsion in America: kerosene, 2 gallons; whale oil soap, ½ lb. (or soft soap, 1 quart); water, 1 gallon. This

must be afterwards diluted. It is prepared by first dissolving the soap, finely divided, in the water by boiling, and then adding it immediately—boiling hot, but away from the fire—to the kerosene. The whole mixture is then churned up while hot with a force pump. After three to five minutes' pumping the emulsion should be perfect; the mixture will have increased by one-third to one-half in bulk and assumed the consistency of cream. Well made, it should keep indefinitely.

If the water in any locality is hard, it should be softened; or a milk emulsion formula is suggested instead. For this 2 gallons of kerosene are mixed with 1 gallon of sour milk. Heating is unnecessary, otherwise this emulsion is prepared in the same way as the former. The change from a watery liquid to a thick buttery consistency, much thicker than with the soap, takes place very suddenly after from three to five minutes' churning.

During the growing period of summer, for most aphides and other soft-bodied insects, the emulsion is diluted with from fifteen to twenty times the quantity of water, and for scale insects, with from seven to nine times the amount of water.* In the case of red spider and other plant mites the weaker mixture is used with the addition of 1 oz. of flowers of sulphur per gallon. The emulsions should be sprayed over the plants immediately upon the appearance of the insects. The application should be just sufficient to wet the plants, without allowing the liquid to run down the trunks of the trees. Care must also be taken that the emulsions are sufficiently diluted, as, if used too strong, they may injure the trees.

Fumigation with hydrocyanic acid gas of trees infested by scale and other insects has proved satisfactory in America, but a disadvantage is the highly poisonous nature of the gas. Bisulphide of carbon, a very inflammable material, has also been tried with good results on low-lying plants, but this is found more especially satisfactory in the case of insects attacking grain stored in warehouses, and subterranean insects such as the wireworm, etc.

* It may be noticed that in England dilutions of less strength—both in the case o the emulsions and the arsenicals—are frequently recommended.

Almost entire reliance is placed in America on caustic insecticides, or those that act externally, for the subterranean insects living on the roots of plants, including both sucking and biting insects, such as maggots in roots, root lice (aphides), etc., as also the surface caterpillars. The insecticide must be one that will go into solution and be carried down by water. Of this sort are the kerosene emulsions, and potash fertilisers such as kainit. Some simple remedies which have been found useful are the application of strong soap or tobacco washes to the soil about the stem; or soot, ashes, or tobacco dust buried about the roots; lime and gas lime are also thus employed. But in the case of some underground insects, notably wireworms, the remedies are of but slight value. As a means of destroying root-lice, particularly the woolly aphis, the most generally recommended measure is hot water, applied at nearly boiling point about the base of the trees, in sufficient quantity to wet the soil thoroughly to the depth of several inches. As much as possible of the surface soil should be first removed. The injection of bisulphide of carbon into the soil around the infected roots has also proved most beneficial. A preventive measure which has also met with success against this insect is the placing of tobacco dust in the trenches in which seedlings are planted, and in the holes dug for young trees. For large trees, from 2 to 5 lbs. of the tobacco dust (a waste product of tobacco factories) is distributed round the tree to a distance of two feet, from four to six inches of the surface soil being first removed.

Another valuable wash, and one which should be used by all orchardists, is the caustic alkali wash. This is employed during the winter, February being the best month in Great Britain. The effect of this wash is wonderful in an old orchard; it removes all the moss and lichens from the trees, and thus destroys the winter quarters of many hibernating insects, kills many of the dormant insects, and also destroys the eggs of some pests, such as those of the Apple Sucker (*Psylla mali*), and those of certain mites and aphides. It is made by dissolving 1 lb. of caustic soda and 1 lb. of carbonate of potash in water, and adding the same to 10 gallons of soft water and ½ lb. of soft soap.

MANURING OF SWEDES AND POTATOES.

Experiments in connection with the manuring of swedes were conducted during the past year at thirteen centres in the County of Durham, under the superintendence of Professor Middleton, of the Agricultural Department of the Durham College of Science, but at three of the centres the crop suffered from disease, and was not weighed.

The principal object of the experiments was to determine the effects of employing artificial manures with and without dung to the swede crop. It was found that when $6\frac{3}{8}$ cwt. of a general artificial manure, costing 24s., and compounded from superphosphate, kainit, nitrate, and sulphate, was used with twelve tons of dung, and the increase in crop valued at 8s. per ton, the added artificials did not leave a direct profit, although the season was favourable to the action of artificial manures. When slag was substituted for superphosphate, the increase in crop just paid for the artificial manure. It is held, however, that, from the results of rotation experiments, there can be no doubt that, in most cases, there would be a substantial profit from the use of the artificial mixtures if the effects on the subsequent crops could be shown.

In these experiments on the swede crop of the past year, a nitrogenous dressing was found the most profitable of the artificials used with dung; the addition of $\frac{1}{2}$ cwt. nitrate of soda and $\frac{3}{8}$ cwt. sulphate of ammonia to $3\frac{1}{2}$ cwt. of super. and 2 cwt. of kainit gave an increase in the average crop of two tons per acre, at a cost of about 9s.; and, as in the experiments of former years, a general artificial mixture paid better than a special mixture when used with dung, though this is, it is observed, a subject on which further experimental evidence is required.

The most profitable artificial mixture for use without dung was found to consist of 5 cwt. basic slag, 4 cwt. kainit, 1 cwt. nitrate of soda, and $\frac{3}{4}$ cwt. of sulphate of ammonia, at a cost of 38s. per acre. A similar mixture, containing 7 cwt. of superphosphate in place of 5 cwt. slag, produced 12 cwt. more roots, but at an extra cost of 10s. Bone meal, when used with dung, did fairly well as compared with equivalent amounts of superphosphate, nitrate, and sulphate; but in the absence of dung, bone meal made a poor substitute for the more soluble manures.

On five farms, where the soil was found to be most deficient in available phosphates, the soluble phosphate in superphosphate produced an average increase of $14\frac{4}{5}$ tons per acre over the plots which received no phosphates; whilst the same quantity of insoluble phosphate in slag and in bone meal produced respectively $14\frac{4}{5}$ and $13\frac{1}{5}$ tons. With regard to the latter, there was some evidence that the smaller average crop was due to the fact that half of the nitrogen for the bone meal plot was supplied in an insoluble form. It would appear that as sources of phosphate both basic slag and bone meal proved to be perfect, and, in one case at any rate, profitable substitutes for superphosphates.

As in former years, heavy dressings of dung did not prove profitable on the average of these experiments, and, though in certain cases they may prove economical, present experience is held to point to dressings of not more than 12 tons (18 to 20 loads) as being the most suitable.

An experiment on the manuring of potatoes was conducted by the Agricultural Department of the Durham College of Science at six farms in the county of Durham in 1900. The results on five of the farms (in one case the soil proved unsuitable for the experiment) showed that a dressing of $1\frac{1}{8}$ cwt. sulphate of ammonia, $1\frac{3}{4}$ cwt. superphosphate, and $\frac{3}{4}$ cwt. sulphate of potash, costing 23s. per acre, proved to be a very profitable addition to 12 tons of farmyard manure, and slightly more profitable than double the quantity of artificials. The most profitable mixture of artificials for use without dung consisted of $2\frac{1}{4}$ cwt. sulphate of ammonia, $3\frac{1}{2}$ cwt. of superphosphate, and 3 cwt. of sulphate of potash. This mixture cost 54s. 6d. per acre. It seems probable that it

would have been more profitable than it was if ½ cwt. nitrate of soda and 1 cwt. fish meal had been substituted for 1 cwt. sulphate of ammonia; the profits yielded by it were, however, greater than those obtained from dung and artificials. These experiments, and those made in the previous year, indicate that when the potato occupies a portion of the fallow break, dung should be used; when it does not, farmyard manure may often with advantage be omitted, and artificial manures only used.

In the absence of dung, heavy dressings of sulphate and muriate of potash have proved advantageous; heavy dressings of kainit have, on the other hand, somewhat decreased the yield. In two instances it was noticeable that kainit hastened ripening. In both these cases the percentage of dry matter in the potato crop was much reduced. On each of the five farms, and also at the College farm, the use of kainit lowered the percentage of dry matter. The average reduction amounted to 2·88 per cent. of dry matter, which means that the food value of eight tons of potatoes grown with kainit was, on the average, no greater than seven tons grown with sulphate of potash.

Experiments in the manuring of potatoes were also repeated in the past year at twelve centres in Lancashire, under the direction of Mr. F. P. Walker, the Agricultural Lecturer of the Harris Institute, Preston. The object of these experiments was to ascertain the comparative effects of a dressing of 20 tons and 10 tons respectively of farmyard manure, and the results of applying artificials with a moderate dressing of dung.

The results showed that the heavier dressing of dung produced an increase of crop which left a substantial profit, and they confirmed the general experience obtained at the various experimental centres in connection with other agricultural colleges, that potatoes are a crop which respond in a remarkable degree to large applications of farmyard manure. In farm practice, however, in the majority of cases sufficient farmyard manure cannot be spared to give such heavy dressings, and it is therefore important to note that in these experiments, as in those previously reviewed in this

Journal, a dressing of 10 tons of dung with a complete mixture of artificials gave a very profitable return. The best mixture consisted of 4 cwts. superphosphate, 1 cwt. sulphate of potash, and 2 cwts. sulphate of ammonia. It was noted that there was less disease among the potatoes where potash was added to the mixture of artificials.

Mr. Walker points out that in generalising on the effects of the various manures on the potato crop, he has taken the average of all the centres, but he recommends those who are interested in the subject to study carefully returns from centres situated in their own district, as it is well known that the nature of the various soils and climatic conditions have much to do with the effect of artificial manures. He adds, moreover, that the results have been affected in no small degree by the use of different varieties of potatoes at the several centres, inasmuch as some varieties, *e.g.* "Up-to-Date," respond to a greater degree than others, *e.g.* "Main-crop," to heavy manuring, and future experiments should, in his view, be conducted with special reference to this point.

PASTEURISATION OF MILK AND CREAM.

In this Journal for June 1900 a review was given of the results of certain experimental investigations relating to the pasteurisation of milk and cream carried out by Messrs. Farrington and Russell at the Wisconsin Experimental Station, Wisconsin. These experiments were designed to ascertain the effect of a temperature of 140 deg. Fahr. on the consistency and creaming property of milk, and whether exposure to that temperature would destroy the bacillus of tuberculosis. It had been usually held that to destroy this bacillus exposure to a temperature of 155 deg. Fahr. for 15-20 minutes was requisite ; but milk or cream pasteurised at 155 deg. Fahr. becomes much thinner in consistency, although the amount of fat remains altered. Moreover, the cream in such milk does not rise to the surface, and the impression might be created that the article is deficient in butter fat owing to the fact, discovered by Messrs. Babcock and Russell in 1896, that in milk heated to more than 140 deg. Fahr. the fat globules become uniformly diffused throughout the product instead of being aggregated in tiny clots or clusters as is the case in normal milk. Certain investigations by Dr. Theobald Smith as to the exact temperature at which the vitality of the tubercle bacillus was destroyed had, however, shown that an exposure of 140 deg. Fahr. for twenty minutes was usually sufficient to destroy the organism of bovine tuberculosis. The confirmation of this result by tests on a practical scale would permit of such modification of the pasteurising temperature as would do away with the usual objection to pasteurised products, and Messrs. Farrington and Russell's experiments were accordingly directed to the

determination of this point. The plan of these investigations is described in the number of the Journal referred to above. Briefly, the results showed that in milk pasteurised at 140 deg. Fahr. for either 15 or 30 minutes the cream rose as quickly and as completely as in the case of normal milk; that the creaming property was normal in samples pasteurised at this temperature for 60 minutes; that there was no difference in the keeping quality of milk heated to 140 deg. for 15 or 30 minutes and milk heated to 155 deg. for 15 minutes —these results were further confirmed by a bacteriological examination—and that there was no difference between the consistency of raw cream and that heated to 140 deg. for 30 minutes.

It was found, therefore, that a temperature of 140 deg. Fahr., if maintained for a sufficient period, was effective in destroying these bacteria, and the point which remained for determination was how long an exposure at this temperature would be requisite to destroy the tubercle bacillus. Dr. Theobald Smith's researches had shown that when the milk was agitated during pasteurisation, the period of exposure could be materially reduced below 60 minutes, which had been previously considered necessary; and Messrs. Farrington and Russell undertook to re-test this point under factory conditions. These tests were made during 1900, and the results have been communicated by Dr. Russell to a meeting of the American Public Health Association at Indianapolis. The milk to be tested was heavily charged with living tubercle bacilli, and injections of the pasteurised milk were injected intraperitoneally into guinea-pigs. In all cases the milk which had not been heated produced tuberculosis; the milk exposed to a temperature of 140 deg. for only five minutes also produced tubercle; but no trace of the disease could be found in the guinea-pigs injected with milk which had been kept at this heat for ten minutes or longer. The conclusions arrived at by Dr. Russell are as follows:—

1. An exposure of tuberculous milk in a tightly-closed commercial pasteuriser for a period of ten minutes destroyed in every case the tubercle bacillus as determined by the inoculation of such heated milk into susceptible animals like guinea pigs.

2. Where milk is exposed under conditions that would enable a pellicle or membrane to form on the surface the tubercle organism is able to resist the action of heat at 140 deg. Fahr. for considerably longer periods of time.

3. Efficient pasteurisation can be more readily accomplished in a closed receptacle such as is most frequently used in the commercial treatment of milk than where the milk is heated in open bottles or open vats.

4. It is recommended in order to thoroughly pasteurise milk so as to destroy any tubercle bacilli which it may contain, without in any way injuring its creaming properties or consistency, to heat the same in closed pasteurisers for a period of not less than 20 minutes at 140 deg. Fahr.

Under these conditions one may be certain that disease bacteria such as the tubercle bacillus will be destroyed without the milk or cream being injured in any way. For over a year this new standard has been in constant use in the (Wisconsin) University Creamery, and the results from a purely practical point of view reported last year (1899) have been abundantly confirmed.

The pasteurisation of milk for butter-making also formed the subject of a series of experiments during the past year at the Ontario Agricultural College. Vats of milk were heated before separating to the following temperatures—viz.: between 140 and 150 deg., 150 and 160 deg., 170 and 180 deg., 180 and 190 deg., and 190 and 200 deg.; and the results were compared with vats of similar milk heated to a temperature ranging between 90 deg. and 100 deg. before separating. In all the trials the milk was thoroughly mixed in a large vat and then equally divided, one-half being heated to a temperature varying from 90 to 100 deg., and the other half to temperatures ranging between 140 and 200 deg. The principal results indicated that milk heated to temperatures between 140 and 200 deg. before being separated showed that more fat remained in both the skim milk and butter milk than in the case of milk separated at 90 to 100 deg. The separated cream from the milk pasteurised at the higher temperatures was less in bulk, but contained a higher percentage of fat, churned in less time, and produced slightly more butter. There was more sediment or " mud " in the separator bowl after running through the pasteurised milk than there was from the unpasteurised milk.

The creaming property of milk by the gravity process decreased with an increased temperature before setting. The whole milk averaged 4·08 per cent. fat, and the skim milk contained 3·08 per cent. fat when the whole milk was heated to

180 deg. before setting. Heating to 170 deg. before setting produced skim milk testing 3·2 per cent. fat; heating to 165 deg, 1·8 per cent.; 160 deg., 1·6 per cent.; 150 deg., 1·0 per cent.; and 140 deg., 0·88 per cent. Similar samples of milk which were set at the ordinary temperature, without heating, gave skim milk testing an average of 0·51 per cent. fat. All the lots were set for 24 hours in water which was at a temperature of from 40 deg. to 45 deg. Tests with the creamometer showed a very indistinct "cream line" in all the heated samples, especially in those heated above 140 deg.

It was further found that the keeping quality of the butter and of the skim milk was much improved by heating the whole milk to the higher temperature before separating. Three boxes of butter made in May—one from unpasteurised milk, one from milk heated to 140 deg., and the other from milk heated to 190 deg., were kept at an average temperature of about 55 deg. until August 17th. These boxes were examined from time to time, and it was noticed that the butter made from milk heated to 190 deg. held its flavour best, and was quite as good in other respects as the butter in the other boxes. On August 17th the scores for flavour were 38, 35, and 32 (max. 45) in the order of decreasing temperature at the time of separating. The moisture-content of the pasteurised butter was 10·77 per cent.—one per cent. less than that of the sample of butter made from unpasteurised milk.

The conclusions drawn from the results of these experiments are that the pasteurisation of the milk or cream tends to produce uniformity of product, and adds to the keeping quality of the butter. The higher the temperature of the milk the better was the keeping quality of the milk and butter, but the greater was the expense of heating and cooling. Though there is probably some danger of giving a "cooked flavour" to the butter, when pasteurising cream at temperatures above 160 deg., no such flavour was noticed in the butter made in the above experiments. In connection with this question it may be observed that in Denmark, where the pasteurisation of cream

for butter-making is becoming more and more common, there would appear to have been a gradual tendency to increase the pasteurising temperature. Thus in the butter trials held in connection with the shows at Odense in Funen practically all the samples submitted in the past few years have been produced from pasteurised cream, whereas in 1894 only 38 per cent. of the exhibits had been so treated. The average temperature at which pasteurisation was effected was at first about 160 deg. F., but this has gradually tended to rise, and in 1899 the average for all the samples was 187 deg. F., while in the case of the prize-winning butters the cream had been pasteurised at a temperature of 188 deg. F. It is to be noted, however, that the butter in these cases was made in winter, this being the season in which the shows are held.

COLD STORAGE AND TRANSPORT IN CANADA.

The Report of the Canadian Minister of Agriculture for the year ended 31st October, 1900, contains an account of the steps taken by the Cold Storage Division of the Ministry to facilitate the carriage and storage of perishable products, mainly for export. The following is a summary of this account:—

In the planning and carrying out of a system of cold storage for Canada, various interests have to be taken into account, such as the producers, the collecting buyers, the carriers or transportation companies, the distributing merchants, and the consumers. The arrangements have been made mainly for cold storage for food products intended for export, but advantages have been provided incidentally for products for home consumption. With what is practically a chain of cold storage available, it is anticipated that the quality of Canadian products will be further recognised by importing merchants and consumers in the countries to which they go.

Contracts have been made with several steamship companies to provide a regular cold storage service for the carriage of butter and other perishable products from Montreal to various points in Great Britain, in chambers cooled and kept cool by mechanical refrigerating machinery of the best and most modern sort. These contracts provide that the steamship companies shall carry in cold storage butter, cheese, and other perishable products, as demand for space may arise, at a charge not exceeding 15s. per ton of butter and cheese, and at the same charge for an equal space

occupied by other products, in addition to the current charge for freight on butter and cheese not in cold storage.

The whole of the cold storage space on all the steamships from the beginning of the service has been reserved to Canadian shippers until within four days of the sailing of the steamships.

The following is a statement of the quantities of some Canadian products carried in cold storage from the port of Montreal during the seasons of navigation 1898, 1899, and 1900 respectively:—

		1898.	1899.	1900.
Butter - - - -	Packages	209,172	429,734	227,863
Cheese - - - -	"	5,514	1,406	—
Fruits - - - -	"	25,564	16,381	8,785

A self-registering thermometer, capable of giving a continuous record of the temperature for fourteen days, was put into nearly every cold storage chamber on each voyage. The charts made by these instruments were sent back to the Department after the cargo was discharged, and they furnish useful information to the shippers, to the ship's engineers, and to the Department.

Arrangements have also been made for running to Montreal refrigerator cars fully iced from some forty-three points in the Dominion; in the majority of cases they run once a week. The railway companies provided the refrigerator cars, and every car was iced to receive butter and other products requiring cold storage at stations between the starting point and destination. Shippers who made use of these refrigerator cars were charged the regular "less than car-load rates," and no extra charge was made to them for the cold storage services.

Cold storage warehouses of sufficient capacity for the trade are provided in Montreal as private business concerns. For the protection of perishable products intended for export and for the extension of business, it is desirable to have cold storage buildings at central points. As the volume of trade did not appear likely at first to be sufficient to induce business men to put up such buildings for this purpose, a grant was offered to those who would provide cold storage

buildings at central points. The grants were to be in the nature of guarantees that the earnings from the cold storage business at these points would yield at least 5 per cent. on the cost of the buildings and plant. The rates to be charged were to be satisfactory to the Department of Agriculture, and the grants from the Government were only to be called upon to make up any deficiency between the net earnings and the sum of 5 per cent. on the cost as mentioned. Advantage was taken of this offer at Quebec only. An agreement was made with the owners of a cold storage building at Charlottetown, P.E.I., to provide cold storage there for the use of the public at reasonable rates.

To encourage the owners of creameries to provide cold storage accommodation to protect the butter from the day after it is made, it was announced that the Government would, subject to ratification by Parliament, grant a bonus of 50 dollars (about £10 8s.) for every creamery at which the owner would provide and keep in use a refrigerator-room during the season of 1897, and further bonuses of twenty-five dollars were offered in later years, if the refrigerator-room was provided and kept in use according to certain plans and regulations. Plans showing the style of construction to be adopted for the insulation of old cold storage rooms, and the methods of constructing new cold storage buildings and ice houses, were furnished on application. The owners of over 400 creameries have provided cold storage in accordance with the regulations. Inspectors of cold storage visited creameries which had provided cold storage rooms in Ontario and Quebec. They also visited places where cold storage buildings were being put up for the protection of general food products of a perishable character. Another cold storage inspector, with headquarters in Montreal, inspected the refrigerator cars on their arrival, examined the cold storage chambers on steamships, and looked after any through shipments of butter or other perishable products intended for cold storage, when notified by the shippers to do so.

Special provision has been given to trial shipments of tender fruits, such as pears, tender apples and peaches, during 1897, 1898, and 1899. A small cold storage building was provided at Grimsby, Ontario. The information which has been gained by the trial shipments for three years shows that pears and the early tender varieties of apples can be shipped in cold storage, landed in good condition, and sold readily at satisfactory prices. It is important that the fruit should be picked in the right condition of ripeness for the particular variety. Some of the shippers in the Niagara district desired to send further trial shipments on their own account and responsibility in 1900.

AGRICULTURAL AND MISCELLANEOUS NOTES.

Effect of Stripping Hop Plants.

For a number of years experiments in the cultivation of hops have been carried out in the garden of the South Eastern Agricultural College at Wye, under the direction of the Principal, Mr. A. D. Hall, M.A., and one branch of this experimental work has been directed to the question of the effect on the crop of stripping the plants.

During the past year about 400 hills were stripped of their lower leaves and laterals to a height of 4 ft. 6 in. on July 3rd, and the hops from these plots were weighed and compared with the hops from adjoining areas where the hills were not stripped, but just kept free from brush. The results showed that the weight of green hops yielded by the stripped area was about 23 per cent. less than that from an equal area of unstripped plants. In similar experiments carried out in 1899, when an abundant crop was obtained, the produce from the two areas was about equal; but in 1898 the stripped plants produced a crop 7 per cent. short of that furnished by the unstripped area.

Thus in 1900 the stripping resulted in a great diminution of the crop; in 1899 it apparently caused no loss; but in 1898 it entailed a considerable loss of crop, though not so great as in the past year. This discrepancy in the results of the several experiments is attributed to the character of the seasons. For though the practice of stripping must give the plant a check at the time, yet in a year of free and abundant growth, like 1899, the plant recovers, and shows no effect of the check in the crop; whereas in seasons like 1898 and 1900, when the growth of the hop was indifferent, the plant

never recovered from the check it received through the stripping.

From these experiments, therefore, it would appear that the poorer the development of the crop the worse is the effect of stripping. On this point Mr. Hall observes : "Stripping in some form or other is a necessary operation in a hop garden, otherwise it would be difficult to keep the lower leaves and laterals free from vermin ; attacks of mould also are nearly always first seen on the lower parts of the plant. At the same time this lower growth, if left, shades the ground and prevents the access of sun and air, conditions which favour the development of mould. Necessary as stripping may be, the experiments show that it may cause a serious and even a disastrous diminution of crop ; it is desirable that growers should give the operation a little more consideration than it usually receives, and in seasons when the bine is slack and the plant is not growing freely it is necessary not to strip so far up the plant as usual, or to go over the garden twice, the first time stripping only for two or three feet, the operations being completed after a fortnight's interval."

Feeding Value of Cotton Cake and Cotton Seed Meal.

During the past winter an experiment was carried out at the Lledwigan Farm, attached to the University College of North Wales, Bangor, to determine the relative feeding values for cattle of decorticated cotton cake and cotton seed meal. Eight Welsh bullocks, two and a half years old, were divided into two lots of four for the purpose of the experiment. These animals were put into boxes at the end of November, and fed alike until the experiment commenced on December 1st. The common daily ration of each beast in both lots throughout the experiment consisted of 4 lb. of maize meal, 5 lb. of long hay, with pulped swedes, straw, and hay chaff *ad lib.*, and there was practically no difference in the amounts of these foods consumed by the two lots.

The animals in Lot 1 received, in addition to the common ration, 4 lb. cotton seed meal each, while those in Lot 2 received 4 lb. decorticated cotton cake, and from January 18th, until the cattle were slaughtered, a further addition of 2 lb. of crushed oats was made to the daily ration of each beast. The animals consumed on the average 10 lb. of chaff and 70 lb. of roots per head per day.

The cattle were weighed before the commencement of the experiment, again on January 25th, and once more immediately before they were slaughtered. They were sold by live weight at 31s. 6d. per cwt. (unfasted), and were slaughtered in two successive weeks, two beasts being taken from each lot on both occasions.

The aggregate live weights of the animals at the beginning of the experiment, and immediately before slaughter, were as follows:—

Number of Animals Slaughtered	Cattle Slaughtered in week ending Feb. 25th.			Cattle Slaughtered in week ending March 4th.		
	Live Weight, Dec. 1st.	Live Weight, Feb. 23rd.	Carcase Weight, Feb. 25th.	Live Weight, Dec. 1st.	Live Weight, March 2nd.	Carcase Weight, March 4th.
	C. q. lb.	C. q. lb.	C. q. lb.	C. q. lb.	C. q. lb.	C. q. lb.
2 of Lot 1	20 1 18	23 0 5	12 1 7	18 2 14	21 0 22	11 2 9
2 of Lot 2	19 0 4	21 1 26	12 0 11	19 2 10	23 2 14	12 2 4

The total increase in live weight was 5 cwt. 0 qr. 23 lb. in Lot 1, and 6 cwt. 1 qr. 26 lb. in Lot 2, the average increase per head in each lot being 1 cwt. 1 qr. 5 lb. and 1 cwt. 2 qr. 13 lb. respectively. The average daily gain per head in live weight of the animals in Lot 1 was 1·65 lb. and their average proportion of carcase to live weight, unfasted, amounted to 54 per cent. In Lot 2 the average daily gain in live weight per head was 2·06 lb., and the proportion of carcase to live weight, unfasted, was 54·6 per cent.

Exclusive of the value of the hay, straw, and roots, the quantities and cost of the additional foods consumed by each lot amounted to £8 17s. 3d. in the case of Lot 1, which

received cotton seed meal, and £9 3s. 3d. for Lot 2, which received the decorticated cotton cake; the difference in cost representing the difference between the price of the meal and the cake alone. These figures give an average cost of £2 4s. 3¾d. per head for Lot 1, and £2 5s. 9¾d. for Lot 2.

On reference to the figures giving the total increase in live weight, it will be observed that the augmentation in the case of Lot 2 was 1 cwt. 1 qr. 3 lb. in excess of that reported for Lot 1, and this margin in favour of the cake-fed beasts represents (at 31s. 6d. per cwt.) a gain of £2. But the cotton cake consumed cost 6s. more than the cotton seed meal, so that the net gain in favour of the cattle fed on cotton seed cake amounted to £1 14s., or 8s. 6d. per head.

IMPROVEMENT OF POOR PASTURES.

The third annual report issued by the Department of Agriculture of the University of Cambridge contains particulars of certain experiments which are being conducted in Essex, Northamptonshire, Norfolk, and Cambridgeshire, under the supervision of the Department, for the improvement of poor pasture as tested by the effects on sheep. These experiments have been planned on the same lines as those which have been carried out during the past four seasons on the Cockle Park farm of the Northumberland County Council, an account of which has already been given in this Journal.* The object is to determine the effects of manurial substances on pasture, not only through their influence on the weight and botanical character of the herbage, but chiefly through the live-weight gain made by sheep with which it is proposed, annually, to stock the land.

Each experimental field selected is divided into plots of three acres, which are surrounded by stock-proof fences, and provided with a supply of drinking water. The soil has been analysed, and the herbage—obtained from an area of one-twentieth of an acre, fenced off on each plot—has been

* See *Journal of the Board of Agriculture*, Vol. V. p. 300; Vol. VI. p. 293; Vol. VII. p. 311.

weighed, sampled, and separated out into its botanical constituents.

The experiments have only recently been started in Essex, Northampton, and Norfolk, but although these stations have, so far, furnished no results attributable to manurial treatment, they have yielded information of much value, for the natural capabilities of every plot have been determined, and the data obtained cannot fail in future years to be most useful as a basis of comparison. The Northampton station, moreover, is situated in a field which is typical of large areas of pasture in the higher and poorer parts of the county, and, should the Northumberland results be confirmed there, the information should prove of service to Midland farmers.

Detailed information is, however, given regarding the Cambridge experiment station, which is situated on a field of very poor boulder clay on the farm of Hatley Wilds, belonging to Downing College. An average sample of the soil indicated ·0087 per cent. potash and ·014 per cent. phosphoric acid soluble in 1 per cent. solution of citric acid. Each plot was stocked with six Oxford cross wedders on the 22nd May, 1900, and two months later the sheep which were fit for the butcher were removed and others substituted. The grazing season was closed on the 9th October. The following table gives a summary of the results obtained:—

Plot	Treatment of plot per acre.	Mean number of sheep per acre.	Live-weight gain per acre.	Mean gain per sheep per week.	Weight of hay from sub-plots per acre.
			Lb.	*Lb.*	*Cwt.*
1	No manure; sheep got daily an average of 0·86 lb. linseed cake (=11·3 lb. nitrogen per acre) - -	6·0	94	2·36	4½
2	½ ton basic slag (=200 lb. phosphoric acid) - - - - - - -	8·1	142	2·62	9¼
3	Unmanured - - - - - -	5·4	74	2·05	6¼
4	¼ ton basic slag (=100 lb. phosphoric acid) - - - - - - -	6·4	117	2·73	11
5	7 cwt. superphosphate (=100 lb. phosphoric acid) - - - -	7·2	127	2·65	18½

The main results, so far as the growth of the sheep is concerned, are stated to be as follows:—

1. The live-weight gain, per acre and per sheep, was distinctly greater on the three manured plots (Nos. 2, 4, 5) than was the case on Plot 1, where the sheep got daily considerably more than $\frac{3}{4}$ lb. per head of linseed cake. A similar result was obtained in Northumberland in 1898.

2. Plot 2, receiving $\frac{1}{2}$ ton of basic slag, carried nearly two sheep more than Plot 4, which was dressed with half the quantity of slag, but the gain per head per week in the latter case was somewhat higher.

3. When equal amounts of phosphoric acid were used in the two forms of basic slag and superphosphate, the latter produced the larger live-weight gain. A similar result was obtained in the first year of the Northumberland experiments.

4. The unmanured plot gave decidedly the lowest yield of animal increase.

Molasses and Dairy Cows.

Experiments were carried out at Poppelsdorf, Bonn, in 1895-6, on the effect of various preparations of molasses upon the secretion of milk. One of the points then investigated was the question whether the influence of a given quantity of sugar was exactly the same when supplied in the form of raw sugar or of molasses; in other words, whether the dry matter, apart from the sugar, contained in the molasses had absolutely no feeding value. It was then found that the molasses had a distinctly higher value than the raw sugar; the amount of fats in the milk yielded by cows fed on molasses being considerably greater than in the milk from cows receiving sugar. Experiments made in supplementing the sugar ration by the addition of salts forming constituents of molasses were not, however, successful in raising the fats content of the milk to the amount yielded by feeding with molasses. Cows fed with 0·36 lbs. of sugar (besides a general ration) in the form of molasses yielded 1·92 lbs. of milk containing 0·0734 lbs. of fat per 100 lbs. of live weight; when fed with raw sugar they gave 1·69 lbs. milk containing 0·0665 lbs. of fat; and when fed with raw sugar with the addition of salts they gave 1·67 lbs. of milk containing 0·0664 lbs. of fat. In these calculations allowance was made for the period of lactation.

The experiment was repeated during the spring of 1900,

and an account of these later tests is furnished by Herren E. Ramm and C. Momsen to the *Milch Zeitung* of 14th July, 1900. In this case the salts, other than sugar, in the molasses were supplied to the cows as an addition to the raw sugar in the form of the "refuse" (*Melasseschlempe*) left after molasses had undergone treatment to free it from the sugar remaining therein. The chemical constituents of the molasses and refuse were as follows:—

		Molasses.	Refuse.
Water - - - - - -	Per Cent	29·25	34·92
Ash - - - - - - -	,,	8·28	22·00
Protein - - - - - -	,,	9·05	21·80
Sugar - - - - - - -	,,	40·98	—
Non-nitrogenous (besides sugar) -	,,	12·44	21·28

The ash contained about 51·27 per cent. carbonate of potash, 23·40 per cent. carbonate of soda, 17·51 per cent. chloride of potassium, 6·53 per cent. sulphate of potash, and 0·40 per cent. phosphate of potash.

Five cows were selected, and in the case of each two-thirds of the period of lactation had elapsed. The experiment commenced on the 15th April, 1900, and was divided into four periods of twelve, nine, twelve, and fourteen days respectively, the results being deduced from weighings, milk yields, etc., taken on the last four days of each period. Throughout the whole time the cows received (per 100 lbs. live weight) 1 lb. of hay, 0·225 lbs. of straw, 5 lbs. of mangolds, and 0·3 lbs. of ground-nut meal. In addition they received, in the first period, 0·6 lbs. of molasses; in the second, 0·264 lbs. of sugar (*i.e.*, the amount of sugar contained in 0·6 lbs. of molasses); in the third, 0·35 lbs. of "refuse," in addition to the 0·264 lbs. of sugar. This refuse contained as much nitrogenous organic matter as the 0·6 lbs. molasses, so that this ration was almost the same as the first. In the fourth period the same ration as at first—viz., 0·6 lbs. of molasses—was again given, so as to permit of a calculation being made to eliminate the influence of lactation.

The chief results are exhibited in the following table. The calculations per 1,000 lbs. of live weight have all been made on the initial average weight—viz., 998·632 lbs. The correction for lactation has been made by assuming

that the falling off in the milk supply due to lactation is measured by the difference between the quantity of milk yielded by the cows, the fat contents, etc., in the fourth and first periods, when the rations were identical :—

	1st Period.	2nd Period.	3rd Period.	4th Period.
Average Live Weight of the Cows - Lbs.	998·632	978·576	980·559	957·858
Fats Content of the Milk - - Per cent.	3·04	2·84	3·39	3·35
Specific Gravity of the Milk - - -	1·03051	1·03055	1·03088	1·02991
Dry Matter in the Milk - - Per cent.	11·54	11·32	12·06	11·76
Quantitative Milk Production :—	Lbs.	Lbs.	Lbs.	Lbs.
Actual Quantities :				
Milk per day - - - - - -	17·795	18·081	16·721	15·011
Fat ,, - - - - - -	0·546	0·513	0·566	0·502
Per 1,000 lbs. of live weight :				
Milk per day - - - - - -	18·000	18·106	16·745	15·032
Fat ,, - - - - - -	0·547	0·514	0.567	0·503
Corrected for lactation :				
Milk per day per 1,000 lbs. live weight	18·000	18·907	18·583	18·000
Fat ,, ,, ,, ,, ,, -	0·547	0·525	0.596	0·547

In summing up the conclusions to be drawn from this experiment, Herren Ramm and Momsen say that it is clear that the effects due to feeding with molasses are not due to the sugar only, but that the other constituents are also efficacious, and the advantages of molasses, which had already been demonstrated at Poppelsdorf as well as elsewhere, must be attributed to these other constituents. Among these it would appear probable that it is the nitrogenous matter that is the most useful, although the remainder may also be of importance.

It may perhaps be mentioned that the molasses and sugar used in these experiments were obtained from beets.

MANURING OF MEADOW HAY.

In the grass districts of Yorkshire it is the usual practice to give meadows either an annual dressing of dung or to give such a dressing once in every two years, and in the latter case artificial manures are sometimes applied in the intervening year. In 1899 an experimental scheme

was initiated by the Agricultural Department of the Yorkshire College at Garforth and other centres in Yorkshire with the object of ascertaining what kinds of artificial manures could be most profitably employed on meadow land in the season when no dung is applied.

The results of two years' experiments have shown that meadow land may be depended upon to respond to an annual dressing of dung, and in each year to leave a considerable margin of profit after half the cost of the dung has been charged to the crop of hay. Dung applied once in every two years influenced very largely the hay crop of the second year as well as that of the first; the resulting profit was practically as good as where dung had been applied every year, since only half the expense had been incurred. This is attributed to the effects of the unexhausted portion of the dung remaining from the first year.

The experiments also showed that in cases where, in the year following an application of dung, dung cannot again be spared for meadow land, artificial manures may be used most profitably. Under these conditions, the results seemed to indicate that, following so closely after dung, potash may be omitted, as the best results were obtained from a mixture of 1½ cwt. nitrate of soda and 2 cwt. of superphosphate. In cases where dung is replaced entirely by artificials, nitrogen, phosphate, and potash must be included in the mixture. The heaviest average crop for the two years was got from an annual dressing of 1½ cwt. nitrate of soda, 2 cwt. superphosphate, and 3 cwt. kainit. In Yorkshire, nitrate of soda, as compared with sulphate of ammonia, has given uniformly better results.

A second scheme of experiments was designed to determine what proportion of nitrate of soda, superphosphate, and kainit respectively would furnish the most profitable artificial dressing for the hay crop. These experiments were commenced in 1899 on identical lines at several centres in Yorkshire and Lancashire, the work in the latter county being carried out under the direction of Mr. F. P. Walker, of the Harris Institute, Preston. The results obtained in both counties showed that the average effects of the two years'

experiments were generally in agreement. The advisability of including potassic manure to complete a mixture for meadow hay was clearly indicated. The mixture which gave the most profitable return in Lancashire in 1899 was 1½ cwt. of nitrate of soda, 2 cwt. of superphosphate, and 2 cwt. of kainit; in 1900 the most profitable mixture proved to be 2 cwt. of nitrate of soda, 2 cwt. of superphosphate, and 3 cwt. of kainit. In Yorkshire, as stated above, the most profitable mixture was 1½ cwt. of nitrate of soda, 2 cwt. superphosphate, and 3 cwt. kainit.

In Lancashire some experiments have also been carried out under the direction of Professor Walker to ascertain the effect of dressings of lime on meadow land. These experiments were commenced at four centres in 1899, and it is hoped to continue them for several years, as the beneficial effects of lime are not generally observed until after the lapse of a year or two. The scheme is designed to determine not only the results of applying dressings of different quantities of lime, but also the effects of heavy applications of bone-flour and slag, and the effects of using farmyard manure in one case with lime, and in the other case with bone-flour and slag. The influence of the different dressings on the character of the herbage is also to be investigated. So far as could be ascertained, lime had not been previously applied at any of the four experimental stations, and the soil was different in each case.

The quantities of lime applied per acre were 5 tons for a heavy dressing and 3 tons for a light dressing; on the phosphatic manure plots 9 cwt. of bone flour and 18 cwt. of basic slag respectively were used per acre; while in the combination dressings with farmyard manure the quantity of the latter was kept uniformly at 10 tons per acre, with the above-mentioned quantities of lime and phosphatic dressings, according as the application of these ingredients was intended to be heavy or light.

The results of the two years' experiments have shown that applications of quicklime increased in both years the crop of meadow hay. The increase in the second year was greater than that obtained in the first year. The heavier dressing of

lime gave a slightly greater increase than the lighter dressing, though the relative increase from the lighter dressing was greater during the second year than from the heavier dressing.

At every station but one, both in 1899 and 1900, there was a slight increase of crop from the use of heavy and light dressings of lime with dung. There was, however, a greater average increase during 1900 from the use of the heavier dressing of lime; but the increase was not sufficient of itself to pay for either of the dressings of lime, and it still remains to be seen whether the actual increase of hay alone during following years will pay for the applications, or whether the action of the lime is of greater value in improving the quality of the herbage. From the results of 1899 it appeared inadvisable to apply dung on the top of a dressing of lime in the same season. About six weeks were allowed to elapse between the times of application of the lime and the dung.

In the first year of application the heavy dressings of phosphatic manures did not of themselves produce any increase of crop. During the second season both increased the crop to a slight extent and by equal amounts. The heavy dressings of phosphatic manure gave better returns when applied with farmyard manure than without, but the increase did not justify such a large outlay in purely phosphatic manures, either when used alone or with farmyard manure.

PRESERVATION OF EGGS.

The following notes on some experiments in preserving eggs have been taken from a Farmers' Bulletin (No. 128) entitled "Eggs and their Uses as Food," lately issued by the United States Department of Agriculture.

Fresh eggs are preserved in a number of ways, which may, for convenience, be grouped in two general classes: (1) Use of low temperature, *i.e.*, cold storage, and (2) exclusion of the air by coating, covering, or immersing the eggs, some material being used which may or may not be a germicide.

The two methods are often combined. The first method owes its value to the fact that micro-organisms will not grow below a certain temperature, the degree of cold varying with the species. It appears from experiments that these germs cannot be killed by any degree of cold, and a very low temperature is thus unnecessary for preserving eggs, even if it were not undesirable for other reasons, such as possible injury by freezing, and increased cost.

The temperature which appears to be preferred in America for storing eggs is about 31° to 34° F., though in England writers have recommended 40° to 45° as being equally satisfactory. Much depends also upon various other conditions, such as the amount of moisture in the air in the cold storage chamber, and the time of year. Eggs which have been stored at a temperature of 30° should be used soon after removal from storage, while those stored at 35° to 40° will keep for a considerable time after removal. Stored eggs should be turned at least twice a week, to prevent the yolk from adhering to the shell.

Eggs are sometimes removed from the shells and stored in bulk, usually on a commercial scale, in cans containing about 50 lbs. each. The temperature recommended is about 30° F., or a little below freezing, and they are said to keep any desired length of time. They must be used soon after they have been removed from storage and thawed.

The substances suggested and the methods tried for excluding air conveying micro-organisms to the eggs, and for killing those already present, are very numerous. An old domestic method is to pack the eggs in oats or bran. Another consists in covering the eggs with lime-water, which may or may not contain salt. The results obtained by such methods are not by any means uniform. Some twenty systems were recently tested in Germany, the eggs being kept for eight months. In the result, only three lots of eggs were found to be all good—viz., those which were varnished with vaseline, and those which were preserved in lime-water or in a solution of water glass. Of these three, preservation in a solution of water glass is especially recommended, since varnishing the eggs with vaseline takes time, and

lime-water sometimes communicates a disagreeable odour and taste.

Several other methods have been tested in various countries. In Canada it was found that, when packed in bran, infertile eggs kept better than fertile. German experiments with brine yielded inconclusive results : in some cases the eggs so preserved were quite good, but in other instances the salt penetrated the eggs.

The preservation of eggs in water glass has often been tested of late in the United States, particularly at the North Dakota Experiment Station. Water glass or soluble glass is the popular name for potassium silicate, or for sodium silicate, the commercial article often being a mixture of the two. It is sold in two forms—as a syrup, of about the consistency of molasses, or as a powder. According to the results obtained in North Dakota, a solution of the desired strength for preserving eggs may be made by dissolving one part of the syrup in 10 parts, by measure, of water. If the powder is used, a smaller amount is required for a given quantity of water. The water glass offered for sale is sometimes very alkaline ; such material should not be used, as the eggs will not keep well in it. Only pure water should be used in making the solution, and it is best to boil it and cool it before mixing with the water glass. The solution should be carefully poured over the eggs packed in a suitable vessel, which must be clean and sweet; and if wooden kegs or barrels are used, they should be thoroughly scalded before packing the eggs in them. The packed eggs should be stored in a cool place; if they are placed where it is too warm, silicate is deposited on the shell, and they do not keep well. It was found best not to wash the eggs before packing, as this removes the natural mucilaginous coating on the outside of the shell. One gallon of the solution was found to be sufficient for 50 dozen eggs if properly packed. It is stated that the shells of eggs preserved in water glass are apt to crack in boiling, but that this may be prevented by puncturing the blunt end of the egg with a pin before putting it into the water.

Lime Mixtures for the Eradication of Scale Insects.

During the course of experiments carried out in the winter of 1898-9, at the Central Experimental Farm at Ottawa, Canada, in whitewashing apple-trees, it was noticed, when the whitewash came off in the summer, that the trees, which had been previously infested with the oyster-shell bark louse (*Mytilaspis pomorum*), were practically free from the insect. Attention having thus been directed to the point, experiments were planned to discover how far this oyster-shell bark louse (or mussel scale, as it is usually called in England) could be eradicated by this means.

Infested trees were accordingly sprayed four times, in November and December 1899, with a mixture of lime and water in the proportion of 2 lbs. of lime to one gallon of water. The results obtained are considered to have been very convincing. It was not necessary to add anything to the mixture for the purpose of making it stick better to the tree, as the loosening of the scales by the lime occurs within the first two weeks after the application of the mixture, for the wash was cracking off badly within ten days after the trees received the application. It also appeared from the experiment that two sprayings were sufficient to give satisfactory results.

These tests indicated that it was the caustic property of the lime, which had been the means of loosening the scales, and further experiments were planned to determine the minimum strength of lime, the number of sprayings, and the time of year to spray. These were carried out in March last year, with rather conflicting results. One conclusion to be drawn, however, was that autumn, and not late winter or spring, was the best time to spray the trees for this purpose in Canada. As large a proportion of scales appear to have been removed by the thinnest washes (1 lb. of lime to a gallon of water) as by the thickest, and it would seem that the thicker and stickier mixtures had the effect of glueing the scales to the trees, thus counterbalancing to some extent the action of the lime in loosening them.

No injury was caused to the trees themselves; and the

experiments are being continued with a view to determining the most economical and satisfactory formula to use for spraying.

It may be noticed that painting or whitewashing scale-infested trees with solutions of lime is a remedy which has frequently been attended with success in this country.

Experiment to Check the Growth of Spurrey.

An experiment to check the growth of a troublesome annual weed in sand land—spurrey—was carried out at Hodsock in 1900 by the Midland Agricultural and Dairy Institute. The field on which the experiment was tried had been sown with oats, and there was so large a quantity of spurrey present that the rows of oats were almost entirely obliterated. The analysis of the soil—a light sand, in poor condition—showed only 0·07 per cent. of lime, while there was 1·98 per cent. of organic matter.

Three plots were dressed on May 18th with the following :—(1) Two tons of ground lime ; (2) 10 cwts. of salt; (3) 5 cwts. of salt. Two other plots were sprayed at the same date with 20 to 40 gallons respectively of gas liquor diluted with an equal volume of water. A week later two further plots were sprayed with 40 gallons of a 10 per cent. solution of sulphate of iron and 40 gallons of a 3 per cent. solution of sulphate of copper. All the foregoing quantities represent the quantity per acre; the plots were 1-40th of an acre in extent.

The sulphate of copper seemed to produce some check on the flowering and seeding of the spurrey, but did not prevent it entirely. At one time the spurrey appeared rather shrivelled, with brown ends to the shoots. The heavier dressing of salt at one time seemed to kill the spurrey in patches, but eventually the weed seemed to grow more luxuriantly on this plot, and flowered as well as any of the others. None of the other dressings had any effect on the spurrey, and none had any effect on the oats.

EXPERIMENTS WITH SWINE IN ONTARIO.*

Experiments have been conducted during the past five years at the Ontario Agricultural College with the object of comparing various breeds of pigs with respect to their suitability for the bacon trade. The breeds chosen were Yorkshire, Tamworth, Berkshire, Chester White, Poland China, and Duroc Jersey. Three hogs of each breed were fed with maize and wheat middlings, and three with barley and wheat middlings. As regards economy of production, the Berkshires and Tamworths gave the most favourable results, but in point of suitability for bacon the Yorkshires showed a decided advantage in quality over the other breeds on the average of the five years' experiments. Tamworths ranked second, and Berkshires a good third; the three remaining breeds have proved decidedly unsuitable for the export trade in bacon.

With regard to the relative merits as feeding materials of maize and middlings as compared with barley and middlings, the results of the experiments showed that the two rations might almost be considered equal in this respect.

Experiments have also been conducted at the Ontario College to determine the influence of food on the firmness of bacon. The results obtained point to the fact that hogs which have plenty of exercise and a mixed diet, or which receive a reasonable allowance of dairy by-products and a mixed grain ration, until they are over 100 lbs. live weight, can be finished off on maize without injury to the quality of the bacon. An exclusive maize diet during a somewhat extended period yielded, however, unsatisfactory results, and produced bacon of a soft, undesirable type.

The mixing of middlings with maize, to the extent of two-thirds at the commencement and one-third at the close of the feeding period, was not successful in counteracting the bad effects of the maize, the bacon thus produced being soft and generally undesirable, but a mixture of one-half barley seems to have had some influence. Barley, either alone or in con-

[*Journal of the Board of Agriculture.* * See Vol. vi. p. 213, and Vol. vii. p. 491.]

junction with oats or middlings, produced bacon of first-class quality.

Close confinement in pens from time of birth to time of marketing had a tendency to injure the quality of the bacon, though the rational use of dairy by-products seemed to compensate largely for lack of exercise.

EARLY SOWING AND LATE PULLING OF ROOTS.

The Report of the Director of the Canadian Government Experimental Farms for 1900 contains an account of some tests conducted during that year at Ottawa to ascertain the influence of early sowing and late pulling of roots. For this purpose 27 varieties of turnips or swedes, 22 varieties of mangolds, and 19 varieties of carrots were chosen. All these crops were sown, in drills two feet apart, on similar soil which had received the same treatment. Two sowings were made, the first on May 16th and the second on May 30th, while the first pulling was on October 16th, and the second on November 6th. The yields are given per acre, calculated from the weights of roots gathered from one row 66ft. in length.

The average yields of the twenty-seven varieties of turnips (per acre) are as follows:—

Average of 1st sowing,	1st pulling	- - - -	32 tons*	1,541lbs	
,, ,, 2nd ,,	,, ,,	- - - -	26 ,,	430 ,,	
,, ,, 1st ,,	2nd ,,	- - - -	35 ,,	1,219 ,,	
,, ,, 2nd ,,	,, ,,	- - - -	28 ,,	1,218 ,,	

These yields point to the advantage of early sowing, an increase of 6½ or 7 tons per acre having been thus obtained. The additional twenty-one days allowed in the autumn also yielded an increase of about 2½ tons.

The results with mangolds were very different. The earlier-sown plots only gave about a quarter of a ton more per acre (a considerable increase is stated to have been obtained from similar experiments in 1898), while the second pullings gave

*Tons of 2,000lbs.

a yield poorer by 6 to 8½ tons on the average. The means of the twenty-two varieties are as follows :—

Average of	1st sowing,	1st pulling	41 tons	1,084 lbs.
,,	,, 2nd ,,	,, ,,	41 ,,	553 ,,
,,	,, 1st ,,	2nd ,,	33 ,,	338 ,,
,	,, 2nd ,,	,, ,,	35 ,,	223 ,,

The carrots exhibited results similar to those yielded by the turnips, early sowing increasing the crop by 4½ to 5 tons, and late pulling giving a yield larger by 2½ to 3 tons :—

Average of	1st sowing,	1st pulling	27 tons	766lbs.
,,	,, 2nd ,,	,, ,,	22 ,,	1,763 ,,
	1st	2nd ,,	30 ,,	668 ,,
,,	,, 2nd ,,	,, ,,	25 ,,	950 ,,

FISHY BUTTER.

The *Agricultural Gazette of New South Wales* for March last contains an account by Mr. M. A. O'Callaghan, dairy expert attached to the Department of Agriculture in that colony, of inquiries conducted by him into the cause of fishy-flavoured butter. As a result of his investigations and experiments he found that he was always able to detect the organism *Oidium lactis* in the fishy butter examined by him, and was, moreover, able to impart the flavour to butter by adding pure cultures of this mould to sterilised cream.

Mr. O'Callaghan remarks that *Oidium lactis*, while not so common in milk as some authors suppose, will, if it is in the atmosphere, prefer milk, more especially milk or cream slightly acid, to any other medium on which to grow. As an example of a possible source of contamination, he found the mould growing luxuriantly in a butter factory where neither walls nor roof, which were of timber and about nine years old, had ever been limewashed or otherwise cleansed ; there were no bad smells to indicate the presence of the fungus. Other observers have also found the *Oidium* to grow well on old woodwork; while Mr. F. J. Lloyd, in his Cheddar cheese investigations in Somersetshire, found it abundant in an earthenware drain-pipe carrying whey to a receptacle in the

farmyard. Besides milk and milk products, the mould grows on bread, decayed fruit, beer wort, etc.

It is noteworthy that the "fishy fermentation" is much more rapid in cream than in butter, and cream containing the *Oidium* for five or six days will make a butter which will be as fishy when churned as an ordinary fishy butter made from cream, say, thirty-six hours old, will be in six or eight weeks.

As regards the effect of temperature, an important feature is the highly resistant power which *Oidium lactis* possesses towards cold. In some fishy butter placed for four months in cold store at a temperature of 25 deg. F., the mould appeared just as vigorous when the butter came out as when it went in. On the other hand, a temperature of 168 deg. F., or more, in the pasteurising machine readily destroys it.

As remedies and preventive measures, Mr. O'Callaghan recommends that pasteurisation might be used as a means of destroying any *Oidium* spores that may gain access to the milk, but that care must also be taken that the room in which the cream is afterwards stored is kept as free as possible from mould-fungi. To attain this, a room with smooth walls, well lighted and well ventilated, is preferable. It would, he thinks, be fairly safe to assert that if all milk were pasteurised before separating, if factories were cleansed and whitewashed regularly, and if the cream were not kept an undue time before being churned, nothing more would be heard about fishiness in Australian butter.

MOISTURE IN BUTTER.

The annual report of the Ontario Agricultural College for 1900 contains a report of some experiments in butter-making to ascertain the effect of various methods on the amount of moisture retained in the finished product. All the lots were churned and worked in a combined churn and worker, as nearly alike as possible.

Butter churned at temperatures between 46 and 56 deg.

did not give results sufficiently uniform to base conclusions upon. The percentage of moisture varied from 8·675 to 11·425.

Butter churned in granules like clover seed contained an average of 11·15 per cent. of moisture; perfect granular butter contained 11·45 per cent; large granular butter contained 10·86; and butter churned into grains like corn had an average of 11·57 per cent moisture.

Butter washed with water at temperatures between 46 and 59 deg. lacked uniformity of results. The moisture content varied from 9·825 to 12·63 per cent.

Butter salted at the rate of one-quarter ounce, one-half ounce, three-quarters of an ounce, and one ounce of salt per pound of butter contained respectively 11·29, 10·47, 9·80, and 9·47 per cent. of moisture; while similar butters to which no salt was added contained an average of 12·38 per cent. moisture.

Butter salted with "paste" (wet salt) contained an average of 10·55 per cent. moisture, while butter from the same churnings, handled in exactly the same way, except that the salt was applied in the dry form, contained an average of 10·75 per cent. of moisture in the finished product.

Butter worked by giving the worker twenty revolutions contained an average of 12·34 per cent. of moisture; and similar butter, worked with thirty revolutions of the worker, contained 9·425 per cent. of moisture.

WHITE SCOUR IN CALVES.

The Irish Department of Agriculture have recently issued a leaflet embodying certain recommendations made by Professor Nocard for the prevention of white scour in calves. Professor Nocard has undertaken an investigation into the causes of this disease at the invitation of the Irish Department of Agriculture, and, though his researches are not yet completed, he is of opinion that the results he has so far obtained enable him to say that he has discovered the nature

of the disease and the modes of its transmission, and to justify him in recommending, with full confidence in their efficiency as preventive measures, the following simple rules:

White scour is generally the consequence of an umbilical infection which occurs at the moment of parturition, occurring through the wound resulting from the rupture of the navel cord. The disease may be warded off by observing exactly the following precautions:—

1. Provide the cows that are about to calve with dry and clean bedding, and keep it in good condition until after the calf is born. If possible, a special stall or loose-box should be provided for calving cows. Strict regard to cleanliness is of the utmost importance.

2. When the cow shows signs of being about to calve, the vulva, the anus, and the perineum should be disinfected with a warm solution of lysol in rain water—20 grammes of lysol to one litre of water (*i.e.*, two parts of lysol to one hundred parts of water). The vagina should also be washed by injecting, by means of a large syringe, a considerable quantity of the same warm solution of lysol.

3. Whenever possible, the calf should be received upon a piece of clean sacking or some such material, or at least upon a thick bed of fresh clean straw, unsoiled by urine or excrement. Or the calf may be received into the arms of an attendant, and held there until the treatment is completed. The object is to keep the umbilicus or navel cord of the newly-born calf from being soiled or infected before treatment.

4. The cord should be tied immediately after birth with a ligature of twine which has been steeped in the lysol solution; the cord then should be cut about an inch below the ligature.

5. The portion of the cord still attached, as well as the region of the umbilicus, should be dressed with the following solution, applied by means of a large brush:—

Rain water - - -	1 litre = $1\frac{3}{4}$ pint.
Iodine - - - -	2 grammes = 31 grains (by weight)
Iodide of potassium - -	4 grammes = 62 grains (by weight).

6. The disinfecting of the region of the umbilicus and the

cord should be completed by dressing them with another brush dipped in the following solutions :—

Methylated spirit - -	1 litre = $1\frac{3}{4}$ pint.
Iodine - - - - -	2 grammes = 31 grains (by weight).

7. The operation is finished, after this spirit has evaporated, by painting upon the cord and the region of the umbilicus a thick layer of collodion and iodine (1 per cent.), applied with a third brush. When the collodion is dry the calf may be left to the care of its mother.

FRUIT PRESERVATION.

An interesting report on the question of the prospects of fruit preservation in this country has been drawn up by the Principal of the South-Eastern Agricultural College, Wye, and presented to the Technical Education Committee of the Kent County Council. Mr. Hall states that as regards the bottling of fruit on a small scale there is little or no difficulty in producing a satisfactory article from fresh fruit and sugar, with the use of several different patterns of self-sealing bottles that are on the market. Although to produce the most attractive article a few details, as to the strength of sugar solution for various fruits, the time, and temperature, require investigation, enough is known for the guidance of people who bottle for domestic consumption. He deprecates, however, the use of antiseptics, especially salicylic acid, as being unnecessary and, in his opinion, harmful.

But while bottling fruit on this small scale is easily done, and might well be part of the routine of every household, Mr. Hall is of opinion that it cannot be taken up by the fruit grower on a large scale, least of all as an occasional means of coping with a year of glut. "The plant required," he says, "and the staff of workers would be expensive, unless they can be employed during more than the brief fruit season. In fine, fruit bottling must be regarded as much the same kind of industry as jam-making, and there is plenty of experience

in Kent that the fruit grower should not attempt jam-making as an adjunct to his own business."

From a number of inquiries he has made into the possibility of drying fruit on a large scale, Mr. Hall concludes that this industry would not be remunerative in ordinary seasons. Most of the evaporators exhibited in this country, though capable of doing good work, are, he thinks, constructed on too small a scale to be of any use to the market fruit grower, but there would be little difficulty in adapting an ordinary hop oast to the work if the process were really remunerative. In connection with this point reference is made in his report to an experiment with a fruit evaporator, which was carried out by the Royal Horticultural Society in their Chiswick Garden during the fruit season of 1891. This experiment was chiefly concerned with apples and plums, the only fruits grown on a large scale in this country that are suitable for drying. As regards apples, no difficulty was found in turning out a satisfactory product, particularly with certain kinds, but it was found that the finished article did not pay for the labour and fuel required. This, being an experiment on a not very large scale, was heavily weighted with such charges, but a consideration of the price alone of the finished article is held to show that profit is unlikely. The price of dried whole apples (Normandy Pippins) is from 6d. to 8d. per lb., the latter being the retail price, the former in half-cwts.; while for apple rings the price is from 4½d. to 6d. per lb. It appears, however, to take from five to nine pounds of fresh apples to make one pound of dried apples, and, moreover, it seems that only well-shaped large fruit can be used without a great loss in the peeling and coring machine, and that only late-keeping dense kinds are really suitable for drying whole. As regards plums, there is, in Mr. Hall's view, plenty of evidence from the Royal Horticultural Society's experiments that the ordinary English market plum does not dry satisfactorily, being too thin-skinned and juicy. In California, where the industry has made great strides of late years, the Prune d'ente, the Fellenberg, and other varieties specially adapted for drying are cultivated, and, though some plums proper are

dried, they are thicker-skinned and more fleshy than the bulk of the English varieties. The fresh prunes are sold to the drying factories at about £6 a ton, while the retail price of the dried plums in this country is about 4d. to 5d. per lb. When it is further considered that it requires three or four pounds of fresh prunes to make one pound of dried fruit, it is clear, as Mr. Hall points out, that the market in England for fresh plums is better than that for dried prunes, at least in ordinary seasons.

The following are the concluding observations of Mr. Hall's report:—"It does not therefore seem desirable that the fruit grower should plant, wholly or partially, prunes instead of plums. The only conclusion I can reach is that, in ordinary seasons, fresh fruit will realise a far better price in English markets than can be obtained for dried fruit, which is the product of districts handicapped by freight charges and unable to sell their fruit in a fresh state. And unless the drying process can be made to pay its way in ordinary seasons, it will not do to have the necessary capital and skill lying idle against the occurrence of a glut year."

AGRICULTURAL WAGES IN 1900.*

In 1900 agricultural wages in England and Wales, which have increased every year since 1895, showed a further increase compared with 1899.

Information as to the rates of wages has been collected in the manner indicated in previous reports, and the same assumptions have been made as previously. The districts in which increases in wages were reported in 1900 contained 281,262 labourers, while no decreases were mentioned. The total increase per week in the districts reported on amounted to £9,939, which is equivalent to a general rise of 8½d. per week per head of those affected. This is almost the same increase as in 1898 and 1899, in each of which years a net

* From the *Labour Gazette*, May, 1901.

rise of 8d. was recorded in the districts where a change took place, but the number affected in 1900 was considerably greater than in earlier years. Calculated on the total number of agricultural labourers in England and Wales according to the census of 1891, the rise per head in 1900 amounted to 3¼d. per week.

By far the greater number of the changes occurred, as usual, in the Eastern and Midland counties, which are the principal corn-growing districts of England.

It may be of interest to give for certain counties in England, where the earnings were highest and lowest in 1898, the approximate increase in total weekly earnings of ordinary agricultural labourers in 1900, as compared with 1898 (the year for which earnings are given in the Report on Agricultural Wages and Earnings. Cd. 346). It has been assumed, for the purpose of arriving at the total earnings for 1900, that the difference between cash wages and total earnings (including extra cash payments and the value of allowances in kind) for 1898, which was based on returns from farmers, was the same in 1900 in each county.

I.—Counties showing highest average earnings in 1898 :—

	Average weekly earnings throughout the year. 1900. s. d.	1898. s. d.
Durham	22 4	20 9
Northumberland	20 9	20 2
Derbyshire	20 6	19 11

II.—Counties showing lowest average earnings in 1898 :—

	Average weekly earnings throughout the year. 1900. s. d.	1898. s. d.
Dorsetshire	15 4	14 9
Oxfordshire	15 1	14 8
Suffolk	15 10	14 5

As regards Scotland, there was, generally, an upward movement in 1900 in the wages of all classes of farm servants. At the spring yearly hiring fairs in the Border counties and the Lothians an increase in wages of from about 20s. to 50s. a year was given in a number of cases. The wages of

ploughmen generally varied between 15s. and 19s. a week, married men getting, in addition, allowances in kind. In other parts of Scotland, at the hirings between March and July, wages of men frequently rose at the rate of 20s. to 50s., and sometimes as much as 60s., per annum. The wages of women, lads, and boys also increased. At the later hirings the old rates of wages were maintained in the great majority of cases, and where changes took place increases were more numerous than decreases. Generally speaking, there was a rise in the coal-mining districts, the ranks of the farm servants having been thinned by migration to the collieries. The wages of women, whether employed as outworkers or in the farmhouses, showed an upward tendency, and reports state that as a class they were generally scarce.

In Ireland, reports received from 81 correspondents show that since 1898 there has been an upward tendency in the wages of farm labourers, though, generally speaking, they have not changed to an appreciable extent. The classes most affected were casual labourers or odd men and hired men lodged and boarded in the farmhouses. Many of the Irish reports referred to a growing scarcity of labour. This is chiefly attributed to emigration and to migration to England and Scotland, but the war in South Africa is also mentioned as an additional cause.

Contagious Abortion in Cattle.

The Department of Agriculture and Technical Instruction for Ireland requested Professor Nocard, who has been conducting the Department's investigation into the causes of the mortality amongst calves in Munster, to furnish them, for the benefit of Irish farmers and stock-owners, with his latest conclusions on the subject of contagious abortion, and these are reproduced below from the *Journal* of the Irish Department of Agriculture :—

As a general rule abortion (epizootic or contagious) makes its appearance in a byre after the introduction of an in-calf

cow which has just been bought. If this cow aborts, one of the herd—although until then they had all, without exception, calved at the proper time—aborts in turn, then a second, a third, and so on. When this occurs the byre is undoubtedly infected, and the disease will recur for several years, sometimes for eight or ten years, with the most discouraging persistence.

If in-calf cows are brought into an infected byre from a non-infected byre or district where abortion does not occur, it may happen that some of them will not calve until their due time. Such cows will be found to be those that were the most forward in pregnancy; of the others, many will abort.

A cow seldom aborts before the fourth month of gestation; after this period abortion may occur at any time.

In most cases the calf is dead when aborted. Sometimes, however, the calf is born alive, and may even be well formed and vigorous in appearance. Nevertheless, in at least nine cases out of ten, it ceases to suck some days after birth, is attacked with diarrhœa, begins to bellow continuously in a strange manner, and dies in a few days, sometimes even in a few hours.

Removing all the cattle from the byre and restocking with cows from a district where abortion is unknown will not be enough to secure the disappearance of the disease. The byre must also be thoroughly disinfected.

Every cow that has aborted (from contagious abortion) should be regarded as useless for breeding purposes. Such a cow either gets the habit of seeking the bull several times in the month without becoming impregnated, or if impregnation takes place she will abort again. Exceptions to this rule are extremely rare. The best course, therefore, is to give up sending the cow to service, and to prepare her for the butcher. If, however, for any particular reason a further trial is desired, the cow should at all events be kept separated from the bull for three or four months, and not put in the same byre with the other cattle. She should be served by a special bull, or, if this should not be practicable, the penis of the bull should be carefully washed immediately after service with the solution of the antiseptic mentioned below, and the

disinfection should be completed by giving him one or two injections into the sheath.

The age, breed, or condition of the cow has no influence whatever on abortion. Cows in calf for the first time are as much subject to it as any others.

A cow about to abort does not appear sick. She is lively, eats, drinks, chews the cud, and milks as well as usual. Nevertheless, a careful and attentive herdsman can generally foresee that a particular cow is on the point of aborting. The usual signs of the approach of calving are apparent. The vulva is slightly swollen, the hip bones are more projecting, the ligaments become slackened ("the cow gets unhooked"); and if it be her first calf, the udder develops just as it does before a normal birth. These symptoms call for the immediate isolation of the suspected animal.

The ejection of the calf takes place without any difficulty. The cow does not appear to notice it, and does not cease to eat or chew the cud; and the abortion is too small to become stopped in the passage. The after-birth or "cleansings," on the contrary, is seldom expelled regularly; in most cases it has to be delivered by hand, and the operation is troublesome on account of its great adherence.

The fluids (or waters) are nearly always altered, dirty, and clotted; the after-birth appears dried up or sodden, and covered with matter, and the cow for a long time after delivery continues to pass foul and purulent discharges.

The calf, the fluids, and the purulent discharges which the cow passes after, and sometimes before, aborting, contain in considerable quantities the germs of the disease; these spread the contagion.

It is through the vulva (the opening into the genital passages) that the contagium usually enters the genital organs of the dam, and, after a long interval, exercises its harmful action on the organism of the calf. Cows become infected mostly when lying down, by the direct contact of the lips of the vulva with the infectious matters with which the soil or floor is contaminated.

Mode of Prevention.

From the preceding data it is easy to arrive at a simple and effective method of prevention.

1. In the case of a large herd which is not yet infected, but which is exposed to infection, the best course would be to have a small byre, or rather a few stalls, to serve as a place of isolation, where newly-bought cows could be kept, so as not to place them in the common byre until after they had calved in due time and under healthy conditions.

2. In the absence of such a place of isolation, every in-calf cow which shows any symptom that might give reason to fear abortion should be at once isolated, and the place where she stood, as well as the channel, should be thoroughly disinfected.

3. Every cow that aborts should be immediately isolated; the abortion and the after-birth should be destroyed by burning or by boiling; the place occupied by the cow, the gutters or channels, and the floor of the byre should be thoroughly disinfected; and the other cows should be subjected to daily antiseptic washings, as prescribed below.

4. If the byre has already been infected for some time, the diligent application of the following course of treatment is indispensable:—

(*a*) Every morning, when the animals are being groomed, the tail, the natural orifices, and parts around and below these, of each cow should be carefully washed with a sponge steeped in one of the following antiseptic lotions:—

Either, I. Rain-water, 25 litres; creoline or cresyl, 1 litre (practically equal to 4 per cent. Jeyes' Fluid); *or*, II. Rain-water, 20 litres; hydrochloric acid (spirits of salts), 1 decilitre; bichloride of mercury (or sublimate), 10 grammes.*

The solution of sublimate being poisonous should be kept in a wooden vessel—a barrel, bucket, or tub—and placed where animals or children will be unable to touch it.

(*b*) Every week the floor of the byre should be scraped, thoroughly cleansed, and freely sprinkled with the solution

* The British Imperial value of the decilitre may be roughly stated at a little more than $\frac{3}{5}$ of a gill (a gill is $\frac{1}{4}$ of a pint), and that of the litre about 7 gills or $1\frac{3}{4}$ pints. The exact equivalents are:—

1 Decilitre = 3·519602 fluid ounces.
1 Litre = 1·75980 Imperial pints.
10 Grammes = 154·3 grains, or about $5\frac{1}{2}$ drachms.

of 4 per cent. of cresyl, or of sulphate of copper (blue vitriol), in the proportion of 40 grammes to 1 litre of rain-water—that is, a 4 per cent. solution.

With these hygienic measures the following preventive treatment may usefully be combined. Its mode of action is difficult to understand, but experience has proved it to be frequently successful :—

All in-calf cows in an infected byre should be given, twice a month, a subcutaneous injection* of 20 cubic centimetres of a solution of pure phenic acid at 2 per cent. (two grammes to 100 grammes of distilled water).

In several byres, where abortion has been very prevalent, these phenic injections have checked the outbreak ; the cows that were forward in gestation alone aborted ; the others calved at their proper time, and the byres have definitely become healthy.

These courses of treatment are very simple, and require only care and patience. When a byre is infected, indeed, a sudden cessation of abortions cannot be expected, as the treatment has no effect on cows which already were infected with the germ of the disease when it was first applied. Such cows will inevitably abort ; and as soon as the first symptoms present themselves the animals should be isolated, in order to subsequently put them into condition and fatten them for the butcher.

During the first trial, accordingly, abortion will continue, but the disease will be less serious, since there will be no fresh cows infected ; and after the second season there will not be a single case of infectious abortion.

These simple hygienic measures, wherever owners of cattle have had the necessary confidence, patience, and

* In regard to the treatment of in-calf cows in an infected byre by a subcutaneous injection of a solution of pure phenic acid, a word may be said. It is not easy for a layman to give a hypodermic injection, and where this cannot be done skilfully the following is suggested by the Irish Department of Agriculture as an alternative :—

Beginning in early winter, mix $\frac{1}{8}$ oz. of Calvert's No. 4 carbolic acid in a bran or other mash, and feed to the in-calf cows every third day, gradually increasing the proportion of carbolic acid to $\frac{1}{4}$ oz. after the animals have taken to it. Continue this treatment through the winter ; of course with the general antiseptic treatment recommended by Professor Nocard.

willingness to try them, have caused epizootic abortion to disappear.

MISCELLANEOUS AGRICULTURAL IMPORTS AND EXPORTS.

The annual Statement of Trade for 1900 gives particulars of the imports and exports of various articles which have not previously been considered of sufficient importance to be enumerated in detail. Imports of baskets and basketware were recorded to the amount of £239,876, chiefly from Belgium, Holland, France, and Germany, whilst willows and rods for basket-making were also received from Germany, Belgium, Holland, and some other countries to the amount of £52,587, as against £38,162 in 1899. The imports of fresh flowers were valued at £200,585, to which total France contributed £125,229, and the Channel Islands £68,743. Glue stock and pieces for making glue were imported to the amount of 150,802 cwts., valued at £122,618, chiefly from India, Australasia, France, Germany, and Belgium; while of 213,163 cwts. of manufactured glue, size, and gelatine, valued at £463,828, about 90 per cent. were received from the Continent of Europe: France, Germany, and Belgium participating to a preponderating extent. The re-exports of glue and glue stock amounted to £89,779. Another article of animal produce—viz., bladders, casings, and sausage skins—was imported by this country to the value of £180,682, chiefly from the United States and New Zealand. Rather over one-third—viz., £64,160—was afterwards re-exported. The articles included under the heading of goods unenumerated were not of great value; but amongst them may be mentioned wood-fibre and waste (£27,537), straw-work (£10,069), albumen (£11,485), mistletoe (£9,187), and everlasting flowers (£12,068); the re-exports of the last item, however, amounted to £10,358.

The exports of British produce which are now entered separately include bran and pollard, of which 811,172 cwts., valued at £178,246, were exported; of this total Denmark

took 631,957 cwts., and the Channel Islands 85,446 cwts. Oil-seed cake and other animal foods to the value of £200,336 were sent principally to Germany, Holland, and other European countries. Confectionery, jams, and preserved fruits to the amount of 30,939,800 lbs., valued at £606,867, were largely consigned to British colonies and possessions, especially the Cape, India, and Australasia. The quantity sent to foreign countries was valued at £165,075. Glue, size, and gelatine, and bladders and sausage casings, were exported to the value of £127,884 and £140,358 respectively, and straw-plaiting to the value of £54,234.

Among other articles exported of British production hitherto not separately enumerated were—hair (£104,225) horns and hoofs (£47,934) hide-cuttings (£78,165), bones (£29,718), feathers (£25,275), plants, etc. (£37,799), basket-ware (£13,937), eggs (£7,372).

FIFTY YEARS' AGRICULTURAL WAGES IN ENGLAND AND WALES.

In connection with the inquiry instituted by the Board of Trade into the rates of wages and earnings of agricultural labourers in the United Kingdom, published last year as a parliamentary paper [Cd. 346], information was sought directly from farmers as to the changes that had taken place in the wages paid by them during the past half-century.

The difficulty of obtaining figures extending over such a period was naturally very great. Persons whose families have occupied a farm for so long a time are not numerous, while those who have also kept accurate books are still more exceptional. Information was, however, obtained from 46 farms in England and three in Wales as to the rates of weekly cash wages paid during a long series of years to ordinary agricultural labourers in receipt of full men's wages, exclusive of payments for piecework, or of extra payments during hay and corn harvests and for overtime, or of the value of any allowances in kind.

Endeavour was made to obtain these records as far as

possible from the books of tenant farmers, because the wages paid on the home farms of large estates are not unfrequently somewhat higher than in the surrounding districts, and they also tend to be less susceptible to change on account of low prices and unfavourable seasons. Of the returns, 31 have been furnished by tenant farmers and 18 by landowners o their agents. More difficulties were experienced in the north and in Wales, and it was finally found possible to summarise the returns so far as regards 33 farms only, of which nine in the midland counties, six in the eastern, and thirteen in the southern and south-western counties, permitted of a subsidiary grouping into these three districts.

These statistics, summarised in five-year periods, are follows:—

Average weekly cash wages of ordinary labourers on certain farms.

Period.	Midland Counties (9 farms).	Eastern Counties (6 farms).	Southern and South-western Counties (13 farms).	England and Wales (33 farms).
	s. d.	s. d.	s. d.	s. d.
1850-54 - - - -	10 6½	9 9	8 8½	9 8
1855-59 - - - -	11 4½	11 3	10 2	10 11½
1860-64 - - - -	11 9	10 7½	10 2½	11 0
1865-69 - - - -	12 4½	11 4½	10 11	11 9
1870-74 - - - -	13 0½	12 8½	11 5	12 7
1875-79 - - - -	14 2½	13 6½	12 1	13 5
1880-84 - - - -	13 8	12 7½	12 1½	13 1
1885-89 - - - -	13 4	11 5	11 11½	12 8
1890-94 - - - -	13 9½	11 7	12 4½	13 1½
1895-99 - - - -	13 11	11 8	12 6½	13 3½

The full details published in the return show that wages were generally lowest from 1849 to 1853, a time of great agricultural depression immediately preceding the period of higher prices during the Crimean War. For England and Wales the lowest average weekly wage in the half-century was 9s. 1½d. in 1851; two farms reporting 6s. only in the early fifties, while there were several returns of 7s. and 8s. at that time.

Between the years 1850 and 1899 the rates of wages paid on the 33 farms increased by 48 per cent.; if, however, the

higher rate prevailing in 1855 be taken for comparison (wages being very low in 1850), the rise is 22 per cent. Or, taking the averages of the quinquennial periods 1850-54 and 1895-9, there was shown a rise of 3s. 7½d. per week, *i.e.*, 37½ per cent.

After the early fifties, there was, speaking generally, a fairly steady rise in wages until 1874-78, a period of great industrial and commercial activity, when wages were also affected by the agricultural lock-out in 1874. The highest point reached was 13s. 6½d. in 1877, a figure which was not surpassed until 1899. The year 1878 was the last of this very high wage period in agriculture, and with the disastrous year 1879 wages began to fall, the decline continuing until 1887 (average, 12s. 6½d.). There has since the latter year been a rise, broken about 1893-96, when wages were even lower in certain counties than they had been since the sixties. After 1897 a rather rapid increase is noticeable, attributed chiefly to the scarcity of labour felt in many places owing to the competition of the industrial districts.

In 1899 the average of the 33 farms amounted to 13s. 8½d. The highest averages for the three districts were 14s. 4d. in the midlands in 1875 and 1877, 14s. in the eastern counties in 1874, and 12s. 11½d. in the south and south-west in 1899.

Notes as to the allowances in kind given to the labourers in addition to their weekly cash wages were recorded, and any variations in such allowances between the earlier and later years were also mentioned. Speaking generally, there has been very little change either in the nature or quantity of these allowances during the half-century.

It is noticeable that in the eastern counties, which are the chief corn-growing districts, the rates of wages have varied considerably more than in the other two groups, where cattle and sheep are more generally bred and fattened, and dairying and mixed farming carried on. The wages in these eastern counties tend very decidedly to follow the price of grain. This is observable to a much less extent in the midlands, where corn crops are a less important factor, and to a still smaller extent in the south and south-west.

Comparing 1895-99 with 1850-54, the statistics show that agricultural wages have risen by 32 per cent. in the midland

counties, by 20 in the eastern, and by 44 per cent. in the southern and south-western counties.

Another point which is brought out by these figures, and which is probably attributable to the principal corn-producing districts having been more immediately affected by the fall in prices, is that whereas wages were formerly considerably higher in the eastern than in the southern and south-western counties, the position is now reversed. The change occurred somewhat abruptly in 1885.

PURCHASE OF ARMY REMOUNTS.

The following instructions are circulated for information by the Army Remount Department:—

In submitting horses to be purchased as remounts for the Regular Service in ordinary times, the following points must be remembered:—

Nothing but young, sound, good-going, fresh-jointed, promising stock will be taken.

Age.—From five to six years old. The Government does not look to obtaining a carefully-broken, perfectly-finished good-mannered horse, though a horse showing vice out of or in the stable will not be accepted.

Height.—Between 15 hands 1 in., and 15 hands 3 in.

Colour.—Bay, brown, black or chestnut; no parti-coloured horses are taken, and those of washy colour will not be accepted. A few greys with good riding shoulders are required for the 2nd Dragoons.

Tail.—No very short-docked horses are purchased.

Blemishes of a material nature preclude a horse from being bought.

Soundness in eyes, wind, and limb essential; no stale, upright, or overshooting joints, and no curby hocks admitted.

Action must be good and true.

Classes.—One half of the horses required for the Royal Artillery and Royal Engineers are for riding and the other half for draught. For Cavalry purposes nothing but riding horses are required. Farmers in England and Scotland

should look to breeding from riding stock, as is done in Ireland.

Price.—Market prices.

If the experiment on behalf of the Government of purchasing horses through farmers and the Yeomanry is to succeed, it will be of no use to expect that any questionable horse will be purchased for the War Office; on the contrary, Army officers have their duty to perform, and in buying are obliged to be most particular.

THE PREPARATION OF PRUNES OR FRENCH PLUMS.

A recent Report by Mr. W. R. Hearn, H.M. Consul at Bordeaux, furnishes some interesting information on the processes followed in the preservation of French plums or prunes. The French plum for export is called the "Prune d'ente," because it is a grafted plum. One species is commonly called "la Robe Sergent," on account of its purple colour, which resembles that worn by gendarmes in the reign of Louis XIV. It is grafted on the stock of the "Mirobolan" plum, while the commoner French plums, used for stewing, are taken from a tree called "Prune St. Antoine." The plums are not cultivated in any systematic way, but are collected from the trees grown here and there in gardens, orchards, vineyards, and fields owned by the peasants, and brought into market at various small towns to which the buyers resort. The Department where the greater part of the plums are grown is the Lot-et-Garonne, of which Agen is the chief town and market.

The plums are gathered in a ripe state and undergo a certain amount of drying before they are brought to market. They are dried either in the sun or in brick kilns until the fruit has lost two-thirds of its bulk. They are then taken to the markets and bought by the preservers.

The plums are sorted and sized at the factory either by hand or by machinery. The women who sort by hand become very expert, and can separate the fruit into various sizes even more correctly than the machines. The machine

used consists of a series of sieves, with perforations of various sizes, placed on a high platform, to which the fruit is lifted by an endless roller hoist; the fruit passes from one sieve to the other until it finds perforations through which it can pass, when it drops through into the proper receptacle, which is made with a trap door at the bottom, and balanced on a lever of a given weight, so that when the weight of plums (say 25 lb.) has dropped into it the door opens and the plums fall into baskets and are taken away for preparation.

The preparation is mostly done after the plums are packed. There are two processes—viz., steam and dry heat. The best plums are packed by hand in glass jars. Inferior plums which are to be packed in boxes are placed in large closed zinc cylinders, about a yard long and 6 inches in diameter. The glass bottles and the cylinders are then closed and taken to the boilers. The jars or the cylinders are packed into these huge copper cauldrons, which are then tightly closed and steam is introduced until the heat reaches 212 deg Fahr. and over. The fruit is kept at this temperature for four or five hours and even longer, when the jars are taken out, cleaned, labelled, and packed in cases for export.

When the cylinders are opened the fruit is taken out and packed in poplar-wood boxes, into which it is tightly pressed by leverage, the bottom layer having previously been neatly laid in a regular pattern by hand. The bottom then becomes the top, and the box, when opened, appears neat and dainty. The system of preparing the box fruit in cylinders is, however, going out of use, and the fruit is now more often packed into the poplar-wood boxes before preparation, and then placed in a large brick drying-room and exposed to the same degree of dry heat as the jars and cylinders in the steam cauldrons. Having been so heated for four or five hours, the plums are considered to be able to stand any climate or temperature.

The wages of persons employed in the plum factories in the country are for women 1s. 2½d., and for men 2s. 5d. per diem, while at Bordeaux they are about 2s. and 3s. 2d. respectively, but women who can place the plums artistically in the bottles earn higher wages than the others.

The value of the fruit varies with the seasons and the size of the plums. The prices quoted in the report range from 32s. to 40s. per cwt. for the largest, and from 6s. 8d. to 12s. for the smallest. The crop also varies considerably from year to year. In 1897 it amounted to 400,000 cwts., and to twice that quantity in the following season. In 1899 it fell to 250,000 cwts., owing to the injury caused by a late frost, and in 1900 the greatest crop on record was obtained—viz. 900,000 cwts.

[*Foreign Office Report, Miscellaneous Series, No.* 546. *Price 2d.*]

EXPENDITURE ON LAND IMPROVEMENTS IN GREAT BRITAIN.

The total expenditure on land improvement in Great Britain that has been made a charge on the land, from the commencement of the Public Money Drainage Acts in 1847, and under the subsequent Improvement Companies' Acts and others, up to the 31st December last, amounts to £17,193,861 1s. 9d., distributed as follows :—

	£	s.	d.
Drainage	8,997,734	8	1
Farm buildings	5,008,175	18	9
Labourers' cottages	1,144,246	18	4
Fencing and embanking	456,767	14	11
Roads	186,515	11	6
Clearing and reclamation	146,561	11	9
Planting	97,682	4	9
Other agricultural improvements	303,332	2	2
Subscriptions to railways	126,923	1	1
Mansions, houses, &c.	725,921	10	5
	£17,193,861	1	9

Four millions of this was public money advanced by the Exchequer under the Public Money Drainage Acts, 1846 to 1856, for the drainage of agricultural land, nearly all of which has now been repaid by those to whom it was advanced. The remainder has been found through the several Land Improvement Companies under their special Acts, and by landowners themselves under the Improvement of Land Act, 1864, and the Limited Owners' Residences Acts, 1870 and 1871.

[*Report of Proceedings under the Tithe Acts, etc. Cd. 502.*]

COLD STORAGE AND REFRIGERATION IN CHICAGO.

The following particulars relating to the employment of low temperatures for storing various products are taken from a report by Mr. A. Getty to the Foreign Office on "Cold Storage and Refrigeration in Chicago" (*Miscellaneous Series, No.* 545).

Ice for the preservation of perishable articles of food has been used in the United States for many years. In 1886 the first mechanical appliance for artificial refrigeration was erected in New York, and three years later in Chicago. This was the Pontifex machine, and from it all the other systems, which are now more widely used, have sprung. Cold storage houses, where natural ice is used as the refrigerating medium, are rapidly giving place to artificial plant, and the making of ice has become a very important industry.

The various uses to which refrigeration can be applied render it one of the most valuable agents in the preservation of all kinds of food products and other commodities, such as the seasoning of lumber, preservation of woollens and furs, the storage of dynamite to keep it at a safe temperature, in arboriculture to check the budding of trees, etc., brought from the Southern States in early spring. In oil refineries, glue factories, india-rubber works, packing-houses, dwelling-houses, hotels, restaurants, distilleries, breweries, soap and chocolate factories, and wine merchants' establishments the science of artificial refrigeration is carried on successfully.

Little has, however, so far been done in the application of artificial refrigeration to hotels and dwelling-houses during the summer months, as it is generally considered too expensive. In one of the Chicago clubs the system is practised with good results. A 20-ton machine is used, the refrigerating agent being anhydrous ammonia. The cooling pipes are placed in the store boxes, and immediately over the inside of the drawers in the kitchen, where the meats and other foods are kept ready at hand. Meat is kept here at 35° Fahr., and milk, eggs, butter, and vegetables at 44°. The kitchen is on the fifth floor of the building, and the consumption of coal per day is about 2 tons.

In Chicago there are four large cold storage houses, representing some millions of cubic feet, each carrying on an extensive business in meat, eggs, poultry, butter, cheese, and fruits, etc.

At the St. Louis Refrigerating and Cold Storage Company's plant there is a street pipe line system whereby the liquid ammonia (used as the freezing material) is carried five miles from the factory, thus supplying refrigeration to the produce and commission men along the route. There are other cities in the United States where refrigeration is supplied in the same manner to hotels, private houses, grocers, butchers, restaurants, etc.

An enormous business is done in eggs, which are taken into cold storage during April. Last year they went in at 6d. per dozen (storage price ½d.), and were in the autumn put on the market at 7½d., and retailed at 1s. to 1s. 2d. per dozen. Before being put into cold storage, eggs should be selected with great care, each one being subjected to the "candling" process in order to detect any defects. The candling of eggs is a very important factor in cold storage. The egg is held up to a strong light in a dark room and its quality tested. Should one decayed egg be carelessly passed over in the candling process, the whole case would be spoilt. In the selection of eggs both size and cleanliness are the main features in determining the quality. The eggs are packed in whitewood boxes and stored away until the winter following. Eggs may also be frozen in bulk, being emptied into 50-lb. tin cans, and stored for any length of time at 30 deg. Fahr. When taken out and thawed, they should be used as soon as possible. Eggs should be stored apart from any strong-smelling product, such as cheese, onions, &c., as they very readily absorb bad odours. It is of the utmost importance that the germ in the egg should be preserved, and the temperature of the room should not vary one-half a degree.

Opinions vary regarding the temperature at which eggs should be kept, two of the large houses in Chicago storing them at 30½ deg., while another carries them successfully at as low a temperature as 29 deg. Eggs may be held in cold storage for six or eight months, or even longer, and are

packed in cases to contain thirty dozen each. They should never be washed.

During the month of September last, 600,000 cases of eggs, each containing thirty dozen, are stated to have been taken into cold storage at the Chicago stockyards. Two of the largest packing-houses are also said to have been laying in supplies from the west, paying 4d. to 6d. per dozen. The business appears, however, to be of a very speculative nature.

Butter may be kept either cooled or frozen, although the latter process is more in practice in Chicago, the flavour and quality being well preserved. Ordinary cold storage butter may be kept at 32 deg. to 35 deg. Fahr., while for freezing a temperature of 20 deg. is recommended, and when carried for any length of time, say four or five months, the prevailing temperature in Chicago is 5 deg. below zero. June is the best month to store butter, which, made in this month, is packed in wooden tubs, spruce or ash being preferred. These tubs are sometimes covered with burlap to preserve their cleanliness. When taken from the freezer during the autumn months, or early winter, it is allowed to thaw in the natural way, the flavour, it is asserted, being stronger and more developed by this method. Farmers get 3d. to 4d. per lb. for butter in Indiana, Kansas, and Nebraska during the summer, taking contracts in small towns to supply it. Butter which went into cold storage in June at 9½d. (¼d. storage) was marketed at 10½d. in the autumn. There is sometimes a shrinkage of 1 lb, per tub.

Butterine and oleomargarine will carry at about the same temperature.

Cheese will keep one year, if necessary, in cold storage. Temperature, 31 deg. to 32 deg., with a variation of not more than 1 deg. It should be in ripe condition before being stored, which is generally from June to January. Dampness should be excluded from the room, otherwise the cheese will become mouldy.

Milk may be kept in cold storage for a short time, but is not as a rule frozen. It is believed that there is a great future for the dairy business in the freezing and cooling of milk, etc.

Meats of various kinds are stored at temperatures varying from 30 deg. to 45 deg. Fahr. Fish and poultry can be treated similarly, though a lower temperature seems to be preferred for fish. The temperatures most suitable for fruit and vegetables are given as from 32 deg. to 40 deg.—or rather more for lemons and peaches.

The Director of the Zymotechnic Institute of Chicago gives the following as the principal uses of refrigeration in breweries: "Cooling of the wort from the temperature of the water as it can be obtained at the brewery to the temperature of the fermenting tubs (about 40 deg. Fahr.); withdrawal of the heat developed by the fermentation of the wort; keeping cellars and store-rooms at a uniform low temperature of about 32 deg. to 38 deg. Fahr.; cooling brine or water to supply attemperators in fermenting tubs; for the storage of hops and prospectively in the malting process."

NORMANDY CIDER.

The Foreign Office have recently issued a Report on the French cider industry, prepared by Mr. Hertslet, H.M. Consul-General at Havre, who states that the production of cider in France last year amounted to 647 million gallons, one-third of this quantity being produced in Normandy. This production, which was greater than the last decennial average by over 300 million gallons, has only once been exceeded during the past seventy years.

The report furnishes some useful information on the method of manufacture pursued in the Department of Calvados, where the apple crop is a matter of interest to every householder, and cider is the ordinary beverage of the people. The trees are generally planted in orchards (which are also used as grazing land), in rows from 15 to 25 feet apart. In some districts they are planted around the fields. Trees in orchards generally receive sufficient manure from the cattle, but in other cases they are manured every autumn.

The apples are gathered as soon as they begin to fall, and it is a general rule, to which great attention is paid in Normandy, to mix several varieties of apples, so that in the juice from which the cider is made the merits of one variety may compensate for or attenuate the defects of another. The fruit is often left in heaps in the orchard or courtyard, but this practice, Mr. Hertslet states, is injurious, as the rain deprives the fruit of part of its flavour and diminishes the quantity of its sugar contents. It should be placed under cover in a well-aired shed, in piles 12 or 15 inches high, so as to prevent it from becoming heated, and to protect it from the effects of frost. The apples must be perfectly matured before being crushed, but they must not be over ripe, and all rotten apples must be carefully excluded. Apples put into the crushing mill shortly after being gathered produce a cider inferior in taste, strength, and keeping qualities.

When the fruit has been "crushed," the pulp is collected into uncovered vats or tubs, and exposed to the air for about fifteen hours. It is stirred occasionally with wooden shovels, so as to bring the mass into contact with the air. It is frequently the practice to place the pulp into the press immediately after it has been crushed in the mill, but this method is not recommended.

The press consists of a circular cage into which the pulp is placed, and pressed by means of a screw, at first slowly, then more rapidly, until the operation is completed. The juice which is obtained from the first pressing is pure cider, which is frequently bottled, and fetches a high price. Cider of this kind and quality is an article of commerce, and is not used locally for every-day consumption. When the pulp has been drained it is taken out of the press and again placed into the vats or tubs, where it is macerated with a certain quantity of water (generally from 4½ gallons of water to 22 gallons of pulp) for fifteen hours or more, after which it is subjected to a second pressing. The cider thus obtained is used locally throughout Normandy as an ordinary beverage, in the same manner as wine in Central and Southern France. The pulp is sometimes subjected to a third pressing, after

maceration with $2\frac{1}{2}$ gallons of water to each 22 gallons of pulp, and with the addition of windfall and other inferior apples. This third pressing is resorted to in bad seasons only.

The compressed juice of the apple, known as "must," is then placed in tubs or vats, in order to obtain proper fermentation, which is the most delicate and troublesome process in the production of cider. According to Mr. Hertslet's report, the vaults in which the cider is fermented should have a constant temperature of 59 deg. Fahr.; the most perfect cleanliness must be observed; no bad smell, no fermentable substance, and no person who is not in good health should be allowed to enter, and all movements must be avoided as far as possible. In some cases the "must" is fermented in barrels or casks, but this does not give such good results as the use of tubs, inasmuch as oxygen is an essential element in the fermentation, and the liquid in vats is more exposed to the air. If fermentation is difficult, a small quantity of warm perry, old cider, sugar, or alcohol may be added; but this process is not recommended unless it is absolutely necessary.

Fermentation is complete as soon as the tub or barrel, when sounded, ceases to give any indication of the slightest ebullition. This occurs after an uncertain interval, depending in a great measure on the weather. It has been known to take place in three days, but it sometimes requires five weeks as a maximum limit.

The liquid gradually becomes clear, the heavier lees settle at the bottom, and the lighter ones rise to the surface. These two layers of lees, above and below the cider, are most harmful to its preservation, and it is necessary to draw off the liquid so as to prevent the upper layer from penetrating through the cider to the lower one. The cider is finally drawn off into a cask which has been thoroughly cleansed and smoked with sulphur.

After the first drawing off, the cider undergoes, after a considerable period, sometimes extending to many weeks, a second fermentation, which is much less energetic than the first. This fermentation manifests itself by the release of

carbonic acid. Since the casks cannot remain hermetically closed each one is furnished with a spigot or vent peg, which allows the gas to escape and prevents the penetration of the outer air. The spigots are maintained in position for several days. The second fermentation causes a muddy deposit at the bottom of the cask, and a second drawing off is therefore necessary. The liquid should not, therefore, be drained down to the lees, as there would be a risk of drawing off turbid cider, and the whole operation would be fruitless.

It occasionally happens that, in spite of the two drawings off, the cider still contains some impurities, which require a clarifying agent for their separation. The best is catechu, used in the proportion of 2 lbs. dissolved in 2 gallons of water to 352 gallons of cider.

Cider is, as already stated, frequently bottled, but when used as an every-day local drink it is invariably preserved in hogsheads or casks. Manufacturers make use of large hogsheads, each containing about 4,000 gallons.

Mr. Hertslet states that immense quantities of cider apples are exported annually from Calvados to Germany, but that, on the other hand, several thousand tons of dried apples are imported into France every year from the United States, as a cheap substitute for fresh apples, for the purpose of making an inferior cider. The normal price of dried apples is 14s. 5d. per 112 lbs. It has been as high as £1 2s. 8d. per 112 lbs., and at the time of writing, after a crop more than double the average one in amount, dried apples fetch 9s. 1d. per 112 lbs.

[*Foreign Office Report, Miscellaneous Series, No. 552. Price 2d.*]

EXPORT OF BUTTER FROM RUSSIA.

The Board of Agriculture have received through the Foreign Office a copy of a report by Mr. A. Woodhouse, H.M. Consul at Riga, upon the steps taken recently by the Russian Government to facilitate the exportation of butter and other perishable products from Siberia to this country.

Mr. Woodhouse says that for some time past the desirability of opening up the Siberian butter trade has occupied

the attention of certain Riga merchants, and, after prolonged negotiations, a well-known firm of shipowners, who are also agents at that port for a large English steamship company, have entered into an engagement with the Russian Government to run a weekly line of fast steamers between Riga and London *via* the Kiel Canal. This will enable producers in Siberia to send their butter direct to consumers in England, instead of negotiating through Danish intermediaries, and shipping their produce *via* Copenhagen, as has been the practice hitherto. The Russian Government on their part have undertaken to run special quick trains from the Siberian butter centres to Riga.

In order to carry out the engagement thus entered into, the agents at the port have acquired three steamers of recent build, each of which has a speed of 12½ knots, and is fitted with patent refrigerating machinery sufficiently powerful to refrigerate all the holds of the steamers. For present requirements, however, four different holds, representing more than half of the carrying capacity of the vessels, are being insulated for the conveyance of butter, frozen game, poultry, meat, or other similar perishable articles. The steamers are timed to leave Riga every Saturday throughout the year at 4 p.m., arriving in London, Millwall Docks, in time to discharge their cargoes on the Wednesday morning. Whenever the navigation of Riga is closed by ice, they will run from Windau.

The special fast trains to run in connection with these steamers are to be composed of refrigerator waggons expressly built for the service, and ice stores have been established along the entire route from the Siberian stations to Riga for the purpose of supplying the ice required during the transit. The time-table of these special trains has been arranged as follows :—

To leave Ob every Thursday at 5 p.m.
,, ,, Kainsk every Friday at 4.40 p.m.
,, ,, Tatarskaia every Saturday at 2.55 a.m.
,, ,, Omsk every Saturday at 2.15 p.m.
,, ,, Petropavlovsk every Sunday at 11.5 p.m.
,, ,, Kourgan every Monday at 5.16 a.m.

arriving at Riga on Thursday at 5 p.m., *i.e.*, fourteen days from Ob.

The demand for room in these special trains has already exceeded the capacity arranged for, consequently application has been made for a second train, which will probably commence running in June, and there is every reason to expect that a third train will be required before long. Owing to this arrangement it will be possible to run Siberian butter from Kourgan, which is one of the most important stations, to London within sixteen days.

In order to tap the Vologda butter district, which is an important one, arrangements have been made for the running of special trains with refrigerator waggons from Rybinsk to Riga, which trains will cover the distance of 600 miles in 64 hours.

For the storing of the goods on arrival at Riga, a large refrigerator or cold store, calculated to provide room for a great quantity of perishable articles, is about to be built on the quay, and it is expected to be ready for work during the autumn of the present year. The town has made a free grant of land for this store, to which a branch line of railway will be laid; and, when all arrangements are completed, goods arriving by rail will be discharged direct from the refrigerator waggons into the cold store and afterwards shipped direct from the store into the refrigerated holds of the steamers without exposure to change of temperature.

Mr. Woodhouse says that there is no doubt that this project, when once in working order, will materially assist in the development of a large trade with England in Siberian produce. The idea has started with butter, of which there is an unlimited supply; but poultry, game, and even meat will probably be included before long. The quick transport will have a great deal to do with the delivery of the goods in sound condition, but the main thing will lie in the measures taken to keep everything cool during transit.

Statistics give the value of the exports of Siberian butter to the United Kingdom in 1900 at something like £1,400,000, and the estimates for the present year, reckoning upon the new transport service, place the figure at £2,500,000; and this will

doubtless grow year by year, provided that no hitch occurs in any of the arrangements that have been made, and, most important of all, that the quality of the butter is kept up.

The Foreign Office have also received a report from Mr. H. Cooke, British Commercial Agent in Russia, to the effect that a trial shipment made by a group of agriculturists in the Governments of Grodno and Vilna with a view to establishing a direct delivery of Lithuanian butter to England has not met with success, owing to the poor quality of the product. Mr. Cooke states, however, that considerable attention is paid at the present time to the matter of the improvement of the Russian butter industry, and that this object is being furthered especially by the Imperial Moscow Agricultural Society. He himself has had more inquiries with reference to Russian exporters and shippers of butter, game, and eggs than on any other subject.

AGRICULTURAL CO-OPERATION IN BAVARIA.

Co-operation appears, from a report lately issued by the Bavarian Ministry of the Interior, to have been carried to a fuller development amongst agriculturists in Bavaria than in perhaps any other part of Germany, owing to the large number of small proprietors; and at the present time the principle of co-operation is stated to have been applied to all branches of Bavarian agriculture. The earliest development was in the direction of obtaining loans for the small farmer at a low rate of interest, by the establishment in 1877 of the first loan bank on the well-known Raiffeisen principle. The number of these banks gradually increased, and in the seventeen years up to 1894 they amounted to nearly 1,000, but in the succeeding five years —1894 to 1899—their formation proceeded at a much more rapid rate, and in 1899 there were no less than 2,329 banks with 161,276 members. In 1898 their total transactions amounted to £10,859,900, the loans granted to members during the year to £1,897,100, and loans outstand-

ing at the end of the year to £3,912,100. In addition to these banks there were also, in 1899, 104 banks on the Schulze-Delitzsch principle, with 64,445 members, of whom about 40% were believed to be agriculturists.

The Raiffeisen banks, in addition to their original object of granting loans, have in recent years undertaken the co-operative purchase of agricultural requirements and sale of produce, but this branch of work is also performed by about 600 separate associations, with 45,600 members.

One direction in which the sale in common of agricultural products, especially corn, has within the last year or two exhibited considerable development, is in the establishment of warehouses, in which such produce is collected, stored, and prepared for sale. In 1899 there were sixty-five such warehouses in existence, while twelve more were being established. The size of these warehouses varies very considerably, for whilst some are provided with various machines for cleaning, distributing, etc., driven by electricity or by oil motors, the smaller warehouses content themselves with setting up a cleaner, winnower, and weighing machine in a simple wooden shed or hired room. The establishment of these co-operative warehouses is actively supported by the State.

Among the societies for co-operative production may be mentioned 52 for dairying and 55 for cheese-making. Societies to the number of 491 have also been formed in certain districts for the erection of dairying premises, which are sublet. About 20 other societies exist in connection with hops, fruit, tobacco, and other produce.

The co-operative ownership of agricultural machinery has been found very successful in Bavaria, especially in the case of steam threshing-machines. Many of the loan banks and other societies also possess machines of all kinds for the common use of their members.

In connection with live stock, there exist 35 horse-breeding societies, with 6,500 members, and 11 herd-book societies, with 7,000 members. These latter societies receive grants from State and from local funds. There were also 976 smaller cattle-breeding societies, 85 swine-breeding societies, and 140 societies with boar stations.

A form of co-operation which has made great progress in the past few years is live stock insurance. By a law passed in 1896 a cattle insurance bureau was established, and in 1898-99 there were 1,270 local unions affiliated to it, with 59,998 members and 271,936 cattle insured.

CO-OPERATION IN RUSSIA.

The Board have received, through the Foreign Office, a copy of a despatch from Mr. H. Cooke, British Commercial Agent in Russia, relating to the co-operative purchase of agricultural machinery in that country. Mr. Cooke states that in several Governments of Russia the zemstvos (or territorial councils) have organised depôts for the co-operative purchase of such machinery of foreign production. Hitherto difficulty has been experienced in obtaining the goods direct from the manufacturers; but the Orlov zemstvo has lately succeeded in doing so, and its example has been followed by the zemstvos in the Volga district. The progress of the depôts has nevertheless been rapid; the turnover of three large zemstvo depôts in the government of Samara reached 700,000 roubles (£70,000) in 1900, and their utility is increasing.

An important meeting of agriculturists was lately held at Moscow, at which a discussion took place upon the measures to be adopted for distributing improved machinery, implements, and seeds. The desirability of joint action by the zemstvos to further the co-operative purchase and distribution of such goods was unanimously recognised. Several speakers advocated the establishment of a central bureau for arranging the purchases, but it was thought preferable that there should rather be district depôts, each district embracing various neighbouring governments.

AGRICULTURAL STATISTICS OF VICTORIA.

The Board have received from the Government of Victoria a copy of the official annual "Statistical Register," which gives detailed information concerning the agricultural statistics of the colony.

Of the numerous subjects treated in the volume, one section refers to the extent of land occupied and cultivated since the first "settlement" in the Colony in 1836, when the total cultivated area consisted of 50 acres of wheat. In the following year the record shows a complete blank, but in 1838 small areas were sown with wheat, oats, maize, potatoes, and tobacco, and these crops have since been grown almost without interruption. Barley has been a continuous crop since 1839, and although rye was also grown in that year, its cultivation did not become permanent in the colony until twenty years later. Vines have been grown continuously since 1842, and roots since 1855. Chicory, hops, grass, and clover seeds first appeared in the returns in 1867-68.

Wheat is by far the most extensively cultivated crop in Victoria. Its area, which has been nearly doubled during the last decade, amounted in 1899-1900 to 2,166,000 acres, which produced $15\frac{1}{4}$ million bushels of grain. The acreage of the other cereal crops in that year was as follows: Oats, 271,000 acres; barley, 80,000 acres; maize, 11,000 acres; and rye, 1,000 acres. The extent in acres of the following crops are also given—viz., hay, 450,000; green forage, 171,000; vines, 28,000; potatoes, 55,000; gardens and orchards, 55,000; pease and beans, 12,000; onions, 4,000; grass and clover seeds, 2,000. There were about 1,300 acres under roots, including mangel wurzel, beets, carrots, parsnips, and turnips; 713 acres under hops; 155 under tobacco; and over 3,000 acres under "other minor crops." The land in fallow occupied over half a million acres, and the total area cultivated in the colony amounted to 3,820,000 acres. The average production in bushels per acre of the principal cereal crops was: Wheat, 7·04; oats, 22·55; barley, 19·71; and malting barley, 18·16. Potatoes ielded 3·13 tons, and hay 1·32 tons per acre.

It was estimated that nearly 62 million pounds of wool, valued at £3,500,000, were produced in the colony in 1899. These figures represent the total quantity exported and wool used in manufacture in the colony, less the quantity imported. The wool referred to is not homogeneous in quality, some being greasy and some washed or scoured. In Victoria the average weight of a greasy fleece is estimated by experts at 5¼ lbs. for merino, and 6 lbs. for crossbred and long wool; but the fleece of the former sometimes weighs as much as 9½ lbs., and of the latter 9 lbs.

The average duration of farm leases in Victoria is now from 2 to 5¼ years, and the average rental per acre in 1900 was from 5s. 0½d. to 23s. 1½d. for arable land, and from 1s. 9¾d. to 8s. for pastoral land. The average weekly rate of wages with rations in 1900 was as follows: Ploughmen, 18s. 2d.; farm labourers, 16s. 6d.; married couples, 22s. 4d.; female servants, 9s. 5d.; mowers, 24s. 4d. (or 5s. per acre); reapers, 26s. 8d. (or 7s. 8d. per acre). Threshers were paid 5d., and hop pickers 3¼d. per bushel; and maize pickers 4d. per bag, without rations. The following rates per acre were paid for machine labour: Machine reaping, with binding, 6s., and 4s. 3d. without binding.

The latest general statistics of farm animals relate to the year 1895, but the following estimate of the numbers of dairy stock and swine are recorded for the year 1899-1900—viz.: 465,469 cows on arable and dairy farms; 73,253 heifers in calf; 243,593 heifers under twelve months old; and 227,309 pigs. The total quantity of milk produced during the year was estimated at 147 million gallons, giving an average of 316·6 gallons per cow. The number of "cowkeepers" is returned at 31,132. There were 3,500 cream separators in use on the farms.

The live stock slaughtered during the year 1899 consisted of 2,558,000 sheep and lambs, 250,000 cattle and calves, and 193,000 pigs. The number frozen, preserved, or salted was as follows: Sheep and lambs, 500,000; pigs, 104,000; cattle and calves, 2,400.

There were 3,000 bee keepers in the colony in 1899. They owned 22,000 hives, of which 8,650 were non-productive. The

yield of honey was over 600,000 lbs., and 11,700 lbs. of beeswax.

The Assistant Government Statist has more recently supplied information regarding the cereal crop for the year ending 31st March, 1901, and the following figures were published in the "Journal of Commerce" (Melbourne) on 9th April, 1901 :—

Crop.	Area. Acres.	Yield. Bushels.	Produce per acre. Bushels.
Wheat	2,011,400	17,800,000	8·84
Oats	362,400	9,600,000	26·42
Barley	9,100	211,000	23·24
,, (malting)	50,000	1,000,000	20·26

WHEAT PRODUCTION IN CHILE.

The Board have received through the Foreign Office a report upon the position of Agriculture in Chile, drawn up by Sir T. Berry Cusack Smith, British Minister at Santiago.

The imports of wheat during the year 1900 and of wheat and flour during the opening months of the current year are proving that in agricultural production Chile is not even stationary but retrograding. Only some eight or ten years back the exports of wheat from Chile amounted to about 200,000 tons, valued at from ten to twelve millions of pesos, or, at the rate of exchange then current of 48 pence per peso, about £2,000,000 per annum. Last year the exports of wheat dwindled to 9,231 tons, while it was necessary to import 16,000 tons of wheat, and already during the current year many cargoes of wheat and flour have arrived, despite the fact that the latter article pays an import duty of 25 per cent.

The following figures serve to show how the export of wheat has declined :—

Year 1890	Exports	2,892	tons.
,, 1891	,,	178,048	,,
,, 1892	,,	145,801	,,
,, 1893	,,	185,962	,,
,, 1894	,,	116,235	,,
,, 1895	,,	78,581	,,
,, 1896	,,	137,565	,,
,, 1897	,,	72,394	,,
,, 1898	,,	77,300	,,
,, 1899	,,	45,812	,,
,, 1900	,,	9,231	

The decline has been attributed to the excessive rainfall of the last three winters, but the fact remains that the decline is equally visible in two years in which the winters were not less favourable than in those other years in which large exports of wheat took place. Another reason put forward for the decadence is the complaint that agriculturists lack the capital necessary to cultivate their lands. This is the excuse of many agriculturists who are unsuccessful and unbusinesslike, but it is not warranted by the facts, for almost all the farms and agricultural estates are burdened with heavy mortgages bearing interest at from 6 to 8 per cent., usually the latter. If the generality of agricultural estates in Chile have been able to be heavily mortgaged, it can hardly be altogether correct to say that agriculturists have been unable to find capital wherewith to cultivate and stock their lands. It is true that the interest payable on the mortgages is onerous, but in the Argentine Republic the interest which agriculturists pay upon capital obtained on loan or mortgage is not less, nor are the charges for carriage of the wheat in that vast territory less; yet agriculture flourishes in a notable manner in Argentina. The money raised by way of mortgage has not, however, in many cases been applied to the improvement and stocking of the estates, but has frequently been devoted to building luxurious houses in the cities and to the maintenance of expensive establishments. Agriculturists in Chile have, moreover, confined themselves almost entirely to the growing of wheat, even when they have had surplus lands lying idle which could have been profitably employed in the cultivation of maize and flax, of which articles Argentina exports large quantities. In Chile the harvests are left lying out in the open as they are cut, and no provision exists for storing the grain. The first rains usually destroy half the harvest, but no amount of experience has yet effected any improvement in the antiquated conditions.

MANUFACTURE OF BEET SUGAR IN THE UNITED STATES.

The manufacture of sugar from beetroot in the United States, as an industry of any importance, is of comparatively recent origin. Experiments in this direction were started as far back as 1830, but they met with no success until about 1870, when the first Californian factory was erected at Alvarado. In 1879 there were four factories in operation: two in California, one in Maine, and one in Delaware. According to the census of 1880 the total capital invested in these four factories was £76,000, the number of men employed was 350, and the production was valued at nearly £60,000.

In 1890 no particulars were collected at the census, as only two factories (both in California) were working. It has been calculated that the output of beet sugar in 1889 was less than 2 per cent. of the total cane and beet sugar of domestic manufacture.

During the last decade the progress of the industry has been rapid. The number of factories had increased to nine in 1897, with an output of 40,000 tons of sugar, or about 12 per cent. of the total amount of sugar produced, while the census of 1900 shows that there were in the previous year 31 factories in the United States, representing an invested capital of nearly £4,375,000 and producing 71,000 tons of beet sugar. By the following year six more factories had been established, the 37 having a nominal daily capacity of close upon 20,000 tons of beet, and capable of manufacturing over 200,000 tons of sugar annually.

The chief centres of the industry are California and Michigan, its development in the latter being very recent. The States with factories in 1900 are as follows: Michigan, 10; California, 8; Utah, 4; Colorado, Nebraska, and New York, 3 each; and Illinois, Minnesota, New Mexico, Ohio, Oregon, and Washington, 1 each. Although Michigan has now the greatest number of factories, those in California would appear to be larger, for they have together a nominal capacity twice as great as those of the more eastern State.

The acreage of beets actually contracted for in 1899 was

135,305 acres, of which about 64,000 acres were in California, and 37,000 acres in Michigan. Owing, however, to the shortage of the crop in various parts of the country, particularly in California, beets were harvested from 105,175 acres only. The total production was 709,516 tons, and the average yield, 7 tons per acre, was very unsatisfactory. The average price paid was about £1 0s. 6d. per ton; values ranking somewhat higher in California.

The total year's output of granulated and raw beet sugar in 1899-1900 is estimated at 71,427 tons; of which 72 per cent. was white granulated, and 28 per cent. raw sugar for refining. It is calculated that 10 lbs. of sugar were obtained from 100 lbs. of beet in the census year. This low yield is thought to be due in a measure to the deterioration of beets at new factories not fully prepared for work when the roots were harvested, and some reports were received to this effect.

[*U.S. Crop Reporter, March 1901.*]

AGRICULTURAL SOCIETIES IN POLAND.

In the annual report on the agriculture of Poland for the year 1900 Mr. Murray, H.M. Consul-General at Warsaw, states that agricultural societies have recently been formed in his district with a view to enable farmers to obtain farm implements on more favourable terms than the local dealers generally offer. The attention of British makers of agricultural machinery and implements is called to these societies, which seek to deal with makers at wholesale prices. There are fourteen such societies, one in each government of Poland and Lithuania, the address of each being Towarzystwo Rolnieze at the chief town of the government. Communications to the societies should be written in Polish. Some societies purchase the goods directly from the dealers and sell them to the farmers on credit at cash prices; others let out the purchased implements at a very low rate of hire to their members, charging, for instance, from 2d. to 5d. per day

for the use of a plough, from 5d. to 2s. for winnowers, and 2s. to 2s. 6d. for drills. It is stated that £29,000 worth of agricultural machinery passed through the hands of the Warsaw society in 1900. Measures have been taken by the societies to enable farmers to obtain artificial manures and the best seed on credit at only 5 per cent. over the wholesale price.

In Lithuania some of the societies intend to undertake certain new projects, such as a pension fund for village officials, higher agricultural instruction, and the issue of an agricultural newspaper. The Vilna society already has its own store, from which members obtain on credit agricultural implements at wholesale prices. It is also intended to start a primary agricultural school. A society for the improvement of local breeds of cattle and an insurance society against damage done by hail have been formed in Poland, and an agricultural insurance society now exists in Lithuania.

These agricultural societies are reported to have been much appreciated and to have done much good, but the weak point of their organisation is that they are too small, and therefore limited in resources, owing to the fact that the authorities will permit only the formation of local societies, whose sphere of activity is confined to a single government.

In order to improve the quality of butter, it is proposed to establish in Poland central butter factories, fitted with all modern appliances, by responsible estate owners who will purchase all the milk from farmers within a radius of ten miles. One half of the requisite capital is to be provided by the local owners, and the other half by a British company, which undertakes to dispose of the whole production. It is expected that this combination will ensure to the local producer a regular market for the butter, and to the British partner and importer half the profits of production and regular delivery throughout the year of a fixed quantity of butter, which will only take from six to eight days to reach the British market.

[*Foreign Office Report, Annual Series, No.* 2578. *Price* 4*d.*]

AGRICULTURAL LEGISLATION IN SOUTH AUSTRALIA.

The Board have received through the Colonial Office copies of three Acts lately passed by the South Australian Government.

The "Fertilisers Act, 1900," provides that every dealer in fertilisers must be registered at the office of the Minister of Agriculture. He must also obtain a licence for every distinct name or brand of fertiliser dealt in by him, and lodge at the office a certificate showing its constituents. Government inspectors may take samples from dealers for analysis, and buyers may also send samples for examination to Government agricultural analysts appointed under the Act.

Provision is already made in South Australia for the supply to farmers of seed wheat, and the "Seed Wheat Amendment Act, 1900," now further provides for an extension of the time of payment for such wheat, or remission of the interest thereon, in cases where serious hardship would result from the exaction of the payment at the due date.

The "Birds' Protection Act" enforces the complete protection of certain birds during the whole year, lays down a close time for others, and specifies those which will not be protected at any time.

IMPORTS OF TINNED MEATS INTO GERMANY.

In connection with the Law of June 3rd, 1900, prohibiting the importation of tinned meats, etc., into Germany,* the Board have received information through the Foreign Office that the Imperial Chancellor has issued a circular to the effect that §12 (1) of that Law does not apply to preserved game or poultry. This notice has been issued in consequence of such goods having been stopped at the frontier.

A notice concerning the application of the same §12 has also been sent out by the Prussian Ministry of Finance, stating that

* See *Journal*, Vol. vii., September 1900, p. 240.

the prohibition in no way applies to the through traffic—in transit through Germany—in the articles prohibited in that country by the law. Such goods must not remain within the Customs limits for more than the time necessary for ordinary forwarding purposes, and cannot, therefore, be place in bonded warehouses. Another point to which attention is called is that, for example, smoked rolled hams have been wrongly turned back at the Custom House. The prohibition only applies to preparations of meat cut small, such as hashed, minced, and forced meat, brawn, etc.

NOXIOUS WEEDS IN NEW ZEALAND.

The Board have received through the Colonial Office a copy of the "Noxious Weeds Act, 1900," recently sanctioned in New Zealand.

This Act provides that occupiers of land in that colony shall clear their land of noxious weeds—viz., sweet briar, blackberry, and the Canadian thistle, unless the two former form hedges or live fences, in which case they are to be kept properly trimmed, and the refuse removed and destroyed. Hedges of gorse and broom must similarly be kept trimmed. Power is given to local authorities to declare certain other plants, including, amongst others, broom, gorse, and ragwort, to be noxious weeds, and when so declared they must also be exterminated.

The Act also prohibits the sale of noxious seed, except gorse seed to be sown, with the permission of the local authorities, for forage or hedges; and of any seed which has not been thoroughly dressed to remove all noxious seeds. Among noxious seeds are included the blackberry, broom, burdock, burr clovers, dodder, dock, fat-hen, gorse, ox-eye daisy, sweetbriar, thistles, wild turnip, and ragwort.

Threshing machines, chaff cutters, and clover dressers which are used on more than one farm are required to be thoroughly cleaned out after being used at each farm.

CANADA AND THE TUBERCULIN TEST.

The Board of Agriculture are informed by the High Commissioner for Canada that the Canadian Government have sent an officer specially to this country to apply the tuberculin test to all cattle over six months old for breeding purposes, and to milch cows intended for export from the United Kingdom to Canada. This arrangement supersedes that by which the test could hitherto be applied by veterinary surgeons in this country approved by the High Commissioner.

The officer appointed is Mr. J. G. Rutherford, Veterinary Quarantine Officer of the Canadian Department of Agriculture, to whom communications regarding the testing of cattle should be addressed. His headquarters for the present are the Canadian Government Offices, 52, St. Enoch Square, Glasgow.

Prize for Copper Fungicides.

The Board have received particulars regarding an international competition to be held under the auspices of the Federation of the Agricultural Unions of Italy, for a prize of £40, which will be awarded to the person who discovers and makes public the best method for obtaining exact and constant results in the determination of the fineness of the flowers of sulphur and of mixtures of sulphur and copper sulphate. The object of the competition is to encourage the special study of this subject; for it is explained that, although there has been considerable progress in the methods of preparation of the different sorts of sulphur used for combating diseases of plants, and the demand, in consequence, has greatly increased, yet the methods actually employed for estimating the degree of fineness of these preparations are now antiquated, and leave much to be desired, especially as regards the mixtures of sulphur and copper sulphate. Competitors must send in

their papers in a sealed envelope before 1st March, 1902, addressed to the head-office of the Federation: *Ufficio direttivo della Federazione italiana dei Consorzi agrari, Piacenza —Italy.* The papers will be examined by a special Commission to be named by the "Reale Accademia dei Lincei—Rome," whose decision will be final.

Cattle Industry of Paraguay.

The industries of Paraguay are as yet in their infancy, and have little interest out of the country. A law was, however, passed in September of last year regarding the establishment of "Saladeros," or meat-salting and preserving factories, which may become an important business in the future. The chief points of interest in this law are that until December 31st, 1901, machinery, materials required for packing, common salt, and chemicals may be imported free of all duty. The concessionaires, however, pay the Government a small tax of 10 to 15c. gold (5d. to 7½d.) per hide on every beast slaughtered. A "saladero" established on the river has shown satisfactory results last year, having killed 2,500 head. Each steer cost about £2 delivered, and gave about 85 lbs. of wet salted hide, which sold in Monte Video at £2 per cwt. Thus each beast slaughtered, besides giving 180 lbs. salted meat and 39 lbs. tallow, fetched about £1 10s. for its hide, showing an actual profit of from 8s. to 14s. per beast.

[*Foreign Office Report, Annual Series, No.* 2610. *Price* 1*d.*]

Hop-growing in Poland.

H.M. Consul-General at Warsaw reports that the cultivation of hops is increasing in Poland owing to the facility with which growers can now obtain credit from the State Bank. Bills are granted on the security of the land, or, if there be a guar-

antee, bills at nine months (with a right to a further three months' credit on part repayment), are also authorised on green hops deposited in the bank warehouses. The bank was, however, compelled to refuse these last-mentioned loans last year. Dealers, dryers, buyers, and brewers are allowed nine months' credit on prepared hops, without the right to prolong. Brewers can also get loans on the security of the declared value of their business (i.e., on which they pay taxes) in order to pay for hops of local production. The services thus rendered to hop growers by these measures are reported to be incalculable. An annual Hop Fair is held at Warsaw in the month of September. Last year 2,813 cwts. were put on the market, but one-third of the crop had been disposed of previously. The prices ranged from 114 to 159 shillings, per cwt. for hops of first quality, and from 93 to 114 shillings for those of second quality. The quotations were very much lower in the previous year, but in 1898 the best hops fetched as much as 213, and the seconds 165 shillings, and even these prices have been surpassed in former years. The headquarters of the first Russian Society of Hop Growers, which have hitherto been at Kharkoff, in South Russia, have now been transferred to Warsaw.

[*Foreign Office Report, Annual Series, No.* 2578. *Price* 4*d.*]

Cocoanut Butter.

The United States Consul at Mannheim has recently reported to his Government that the manufacture of cocoanut butter is an industry of some importance in that city. The product is manufactured from the kernels of cocoanuts, and is sold under the name of "palmin," which is a registered trade term. It is used by cooks as a substitute for butter and lard. It is generally white in colour, and almost tasteless. It melts at about 80 deg. F., and is of the consistency of mutton or beef tallow. It is said to contain more than 99 per cent. of vegetable fat, with only a small trace of water; to "keep" for three or four months in a cool room, and to be

much more wholesome than ordinary fats used for baking and cooking. Cocoanut butter is generally sold in square packages wrapped in parchment paper, but a small quantity is sent out in hermetically sealed tin cases during hot weather. It is sold throughout Germany at the uniform price of 8d. per lb. The Consul states that when furnished to consumers (bakers, etc.) the product is coloured so as to resemble butter, but it is unlawful to colour it when furnished to dealers. The method of manufacture is reported to be secret, and protected by patents. The kernel of the cocoanut—imported in long narrow strips, known as the "copra" of commerce—is subjected to various refining processes which separate the vegetable fat from the free acids and other substances. The fat is then placed in centrifugal machines, whereby the water, etc., is separated, and in the later stages the product is stated to resemble ordinary fresh butter. A by-product which is obtained is sold to the soap manufacturer.

Dairy Factories in Ireland.

The detailed Irish Agricultural Statistics for the year 1900* contain particulars of the dairy factories in Ireland in that year. The number of such factories is returned at 506, two-thirds of which are in Munster. Of this number, 97 are proprietary, 219 joint stock, and 190 co-operative. The quantity of milk supplied to these factories during the year is given as over 120,000,000 gallons, besides more than 185,000 gallons of cream. Inquiry has also been made into the number of separators used, from which it appears that these factories had 985 separators (nearly all of them steam), while, in addition, 899 separators were recorded as used in private establishments. The returns of production show an output from the factories of 401,490 cwts. of butter and 439 cwts. of whole milk cheese. In most instances the skim milk is returned to the farmers.

* Cd. 557. Price 1s. 5d.

Russian flax crop of 1900.

The Russian flax crop of 1900 was very small in quantity, and bad in quality, but the prices were higher than at any time during the past fifty years. Qualities which were bought in the earlier part of 1898 for £4 per 360 lbs. rose in 1899 to £6, and to £7 in 1900. The reports of the poor flax harvest caused the market quotations to rise so high that neither speculators nor spinners would engage in business, the former holding back in expectation of a rise and the latter waiting until the flax came on the market in larger quantities, and the position of the market was clearer. This expectant attitude, in spite of a continued rise in price, lasted several weeks, and when the crop was ultimately delivered business became brisk, and prices fell. The downward tendency did not, however, continue, high prices again prevailed, and were maintained to the end of the year. In consequence of the great demand little attention was paid to the packing and preparing, and, for some time, buyers purchased the flax in almost any condition. At the end of the year prices were from 30 to 50 per cent. higher than those ruling in 1899. [The prospects for the crop of 1901 are reported by H.M. Consul at Warsaw to be very unfavourable.]

[*Foreign Office Report, Annual Series, No.* 2578. *Price 4d.*]

Prevention of Finger and Toe.

Some experiments were begun in 1896 by the Agricultural Department of the Durham College of Science with the object of testing the effects of certain preventive measures for finger and toe. The land selected was all badly, though not equally, affected by the disease in 1896. In the case of two plots, to which 5 cwt. copper sulphate and 10 cwt. ground lime were applied respectively, the dressings used were apparently too small to be of value. Two other plots received 2½ tons common lime, one in February 1897, before ploughing, and the other in November 1899, before the stubble was

ploughed. The former application secured practical immunity from the disease, and the experiment is considered to prove clearly that a dressing of $2\frac{1}{2}$ tons of lime, applied to the soil soon after the removal of the diseased crop, was very much more effective than a similar dressing applied to the stubble in 1899. It is accordingly suggested that land affected by "finger and toe" should be dressed with from two to four tons per acre of common lime, according to the soil and the virulence of the attack, as soon as possible after the diseased crop has been removed.

Farm Animals in Roumania.

The Roumanian Government have issued a provisional statement of a census of domestic animals, taken in the month of December, 1900. The total number of horses was 865,000, classified as follows:—47,000 stallions, 388,000 geldings, 339,000 mares, and 91,000 colts. There were 7,000 donkeys and 500 mules. The number of cattle amounted to 2,589,000—viz.: 24,000 bulls, 1,125,000 bullocks, 751,000 cows (of which more than half were dairy cattle), 360,000 heifers, 285,000 calves, and 44,000 buffaloes. Sheep and lambs numbered 5,644,000, goats 233,000, and pigs 1,710,000.

Formation of District Agricultural Analysts' Association.

A meeting of district analysts holding appointments under the Fertilisers and Feeding Stuffs Act, 1893, was held at the Chemical Society on May 15th, Dr. J. A. Voelcker, M.A., presiding, in the unavoidable absence of Dr. T. E. Thorpe, C.B., F.R.S. Mr. F. J. Lloyd read letters from a number of analysts who were unable to be present, but were in favour of the formation of the proposed association. He then briefly pointed out that England was almost alone in having no official Agricultural Analysts' Association. In the United States such an

association had been in existence for seventeen years, the first steps towards its formation having been taken so far back as 1880, when a meeting was held at the United States Department of Agriculture. The object of this association had been mainly to test various methods of analyses and to recognise as "official" those which were found by the association to give accurate results. Official associations existed in Germany, France, Belgium, and Holland, and had done much to improve the methods of analysis, to bring agricultural analysts into closer relations with one another, and to enable them by combined action to draw attention to desirable changes in the laws which either affected them or their clients, the agriculturists. He thought it was time that a similar association should now be formed in England, and he moved that an "Official Agricultural Analysts' Association be formed, consisting solely of district analysts." The resolution was seconded by Mr. John Hughes, and was subsequently carried. A committee, consisting of Messrs. Otto Hehner, John Hughes, J. A. Voelcker, and F. J. Lloyd, was then appointed to draw up a detailed scheme for the working of the association. Mr. F. J. Lloyd has consented to act as hon. sec.

Live Stock in Germany.

The Board have received through the Foreign Office a copy of the preliminary returns of the census of live stock taken in Germany on the 1st December, 1900. The provisional figures are: Horses, 4,184,099; cattle, 19,001,106; sheep, 9,672,143; swine, 16,758,436; and goats, 3,206,426. These show increases over 1892 of 347,843 horses (or 9·1 per cent.); 1,445,412 cattle (8·2 per cent.); 4,584,184 swine (37·7 per cent.); and 115,139 goats (3·7 per cent.); while sheep have decreased in these eight years by 3,917,469 head (28·8 per cent.).

Frozen Hares.

His Majesty's Consul at Rosario reports that the shipment of frozen hares to the London market is about to be tried as an experiment. This new trade is remarkable, because it is only about sixteen years since hares were first introduced into the Argentine Republic from Germany by a well-known German merchant. In the provinces of Santa Fé and Cordoba these animals have increased to such an extent that in the near future, notwithstanding that they are constantly hunted and shot, they threaten to become a scourge to farmers.

[*Foreign Office Report, Annual Series, No.* 2,609. *Price 2d.*]

REPORTS ON FOREIGN CROPS.

Crops in India.

The second general memorandum on the wheat crop of the season 1900-01, issued in March last, stated that in northern India all the conditions had pointed to a crop of unusual excellence, but that the prolongation of rainy and cloudy weather into February had moderated this expectation, and that rust had developed in some districts. In the Punjab the area was estimated at about 8,453,000 acres, sowings having been greatly increased owing to favourable rains. It was expected that the crop would prove the largest on record, in spite of the presence of rust. In the North-West Provinces and Oudh the rain had been very heavy, and proved injurious on irrigated lands, while rust was reported everywhere. A yield of 80 to 90 per cent. of the normal was expected in most districts. In Bengal the area was a little more than the average, and there were prospects of a crop 5 per cent. above the average. In the Central Provinces the conditions were good, but the area placed under wheat (about 2,040,000 acres), although above the preceding year, was comparatively small. A normal yield was expected. The 1,582,000 acres in Bombay and Sind are not much more than half the average, but slightly more than last year. The condition of the crop here left much to be desired.

Crops in the United States.

The Statistician of the Department of Agriculture states in *The Crop Reporter* for May, 1901, that the area under winter wheat in the United States on May 1 last was

about 28,267,000 acres. This is rather over 2,000,000 acres less than was sown last autumn, but 2,032,000 acres, or 7·7 per cent., in excess of the winter wheat area harvested last year. The condition of the crop at the same date was represented by the figure 94·1, which is 10·5 points higher than the mean of the May averages for the last ten years.

The average condition of winter rye was 94·6, also considerably above the average. Meadow hay was somewhat, and spring pastures slightly, above the average condition at the time of year. Spring ploughing was rather behind on May 1st.

The June report of the Statistician (according to telegrams published in the English papers) states that the acreage sown to spring wheat is estimated to be about 17,000,000 acres, or 1,200,000 acres below that planted in 1900. The total wheat acreage is thus estimated at about 45,000,000 acres. The condition of the spring wheat is represented by the figure 92, or about half a point below the ten years' average. Winter wheat has declined in condition during the month, and on 1st June stood at only 87·8; this is, however, 6·6 points above the average. Hessian fly and drought have caused damage in several States.

The acreage seeded to oats is reported 3·8 per cent. less than that harvested last year: the condition is below the ten years' average. The area under barley is 1·2 per cent. smaller than that harvested last year: the average condition is rather above the mean. The rye sown shows a reduction of 1·9 per cent. from that harvested in 1900: its condition is above the average.

ARGENTINE WHEAT CROP OF 1900-1901.

In a Report recently issued by the Foreign Office on the trade and commerce of the consular district of Buenos Ayres, Mr. Acting-Consul Hankin states that the Argentine Ministry of Agriculture have estimated the production of the wheat

harvest of 1900-1901 at 2,871,440 tons, which, after deducting the quantity required for home consumption and for seed —viz., 880,000 tons—left slightly less than 2,200,000 tons available for export.

Mr. Hankin observes, however, that since the issue of the foregoing figures the crop in Entre Rios and Santa Fé has proved to be much inferior to the estimated yield, and he is of opinion that 1,250,000 tons is likely to be nearer the actual quantity of wheat available for export.

[*Foreign Office Report, Annual Series, No.* 2615. *Price* 2½*d.*]

THE AUSTRIAN HARVEST OF 1900.

The Ministry of Agriculture at Vienna has published the annual statistics relating to the principal grain crops in Austria during the past year. The figures, together with those for 1899, are given in the following table.

CROPS.	AREA.		YIELD.	
	1900.	1899.	1900.	1899.
	Acres.	Acres.	Bushels.	Bushels.
Wheat	2,635,600	2,648,100	40,578,500	49,937,500
Rye	4,211,700	4,547,900	54,801,700	84,968,500
Barley	3,050,500	2,937,900	56,474,000	66,567,600
Oats	4,700,400	4,615,200	101,879,100	121,604,200
Maize	828,900	830,700	14,922,300	14,132,300

The only important variation in the area of corn crops in 1900 was in the case of rye, which showed a decline of 336,000 acres compared with the previous year.

The yield per acre was in each case below the average of the previous ten years, and, excepting in the case of maize, considerably under the out-turn of 1899.

RUSSIAN HARVEST OF 1900.

Particulars of the preliminary estimates of the results of the harvest of 1900 in Russia and Poland have already been

published in the issues of this Journal for December and March last. The Central Statistical Committee have since published complete details of the yields of the principal crops in the seventy-two governments of the Empire. According to these returns the acreage and production of the chief cereals and of potatoes in 1900 is estimated to have been as under:—

Acreage, 1900.

Governments.	Wheat.	Rye.	Barley.	Oats.	Potatoes.
	Acres.	Acres.	Acres.	Acres.	Acres.
50 European Governments - -	39,971,400	65,745,600	17,587,400	37,403,400	6,773,100
10 Polish Governments - - -	1,317,700	4,921,600	1,112,900	2,600,400	2,128,800
4 Caucasian Governments - -	6,229,000	635,400	1,573,300	664 500	211 100
4 Siberian Governments - - -	3,660,600	2,143,400	347,500	2 765,700	173,100
4 Asiatic Governments - - -	1,140,200	55,800	128,200	418 400	21,900
Total - - -	52,318,900	73,502,000	20,749 300	43 852 400	9,308,000

Production, 1900.

Governments.	Wheat.	Rye.	Barley.	Oats.	Potatoes.
	Qrs.	Qrs.	Qrs.	Qrs.	Tons.
50 European Governments - -	39,774,600	96,393,400	22,397,400	76,073,300	16,569,200
10 Polish Governments - - -	2,457,500	7,864,500	2,202,900	5,238,400	8,288,400
4 Caucasian Governments - -	7,096 300	872,400	3,242,400	1,791,200	356,400
4 Siberian Governments - - -	2,513,600	1,843,700	355,200	3,570,100	450,800
4 Asiatic Governments - - -	867,100	39,600	151,000	61[illegible],200	29,800
Total - - -	52,709,100	107,013 600	28,348,900	87,285,200	25,694,600

The general cereal harvest, which, in addition to the four grains named above, includes also spelt, buckwheat, millet, and maize, is stated to have been about 10 per cent. above the quinquennial average in the sixty governments of European Russia. The harvest is, however, reported to have been insufficient, owing to unfavourable climatic conditions, in the Steppe Provinces, in the south-west of European Russia, and also in a smaller area in the north.

For purposes of comparison it may be useful to reproduce the estimates of the acreage and yields of these crops in the Russian Empire in 1899. These were returned by the Central Statistical Committee as follows:—

Acreage, 1899.

Governments.	Wheat.	Rye.	Barley.	Oats.	Potatoes.
	Acres.	Acres.	Acres.	Acres.	Acres.
50 European Governments - -	38,049,400	63,412,700	17,462,300	36,116,400	6,603,500
10 Polish Governments - - -	1,305,300	4,811,800	1,063,500	2,510,000	2,001,600
4 Caucasian Governments - -	5,966,250	615,500	1,489,800	636,200	197,700
4 Siberian Governments - - -	3,178,950	2,325,300	329,800	2,491,400	163,400
4 Asiatic Governments - - -	1,248,300	56,800	141,100	392,900	19,600
Total - -	49,748,200	71,222,100	20,486,500	42,146,900	8,985,800

Production, 1899.

Governments.	Wheat.	Rye.	Barley.	Oats.	Potatoes.
	Qrs.	Qrs.	Qrs.	Qrs.	Tons.
50 European Governments- - -	39,236,700	93,650,300	21,514,700	85,848,000	17,482,500
10 Polish Governments - - -	2,684,600	7,859,600	2,403,200	5,773,000	5,896,100
4 Caucasian Governments - - -	7,141,800	888,300	2,170,400	1,282,800	307,600
4 Siberian Governments - - -	5,666,400	3,550,000	712,400	7,857,800	453,900
4 Asiatic Governments - - -	1,861,400	76,800	343,300	1,002,400	33,300
Total - -	56,590,900	106,025,000	27,144,000	101,764,000	24 173,400

CROPS IN HUNGARY.

According to the Report of the Minister of Agriculture, the crops in Hungary have suffered some injury from bad weather and hail, and there were numerous reports of rust. In general it may be said that the spring was distinctly more unfavourable than last year. Although the appearance of the crops was still tolerable, yet it was to be feared that, if better weather did not shortly set in, the yield would be considerably below last year's.

CROPS IN FRANCE.

An official report on the condition of the French crops on the 10th May, 1901, was published in the *Journal Officiel* of the 6th inst.

The appearance of winter wheat crops was stated to be "very good" in 3 departments, "good" in 43, "fairly good" in 34, and "passable" in 5 departments. Spring wheat had been sown in 42 departments only. The condition was reported "very good" in 1 case, "good" in 18, "fairly good" in 20, and "passable" in 3 departments.

Rye was reported to be "good" or "very good" in 55 departments, and "passable" or less satisfactory in 29.

The departmental reports on the winter and spring oats are as follows: "very good" in 1 and 2 departments respectively; "good" in 20 and 26; "fairly good" in 26 and 31; "passable" in 8 and 7; "indifferent" in 5 and 1. No winter oats were sown in 25, and no spring oats in 5, departments. The spring oat crop was not "up" on the 10th May in 13 departments.

The condition of winter barley was estimated to be "good" or "very good" in 30 departments, "passable" or "fairly good" in 21, and "indifferent" in 1. The crop was not grown in 33 departments. The corresponding figures for the spring barley crop are 25 and 37 departments, and 11 where the crop was not grown. In 12 departments it was not "up."

In the case of potatoes the condition of the crop was reported to be "good" or "very good" in 20 departments, "fairly good" or "passable" in 16, and "indifferent" in 1; but in 48 departments the haulms were not up on the 10th May.

CROPS IN GERMANY.

According to the official report on the condition of crops in Germany at the middle of May, very large areas had had to be ploughed under owing to the crops having come badly through the hard winter. The total area thus

ploughed up was estimated at something like 3,500,000 acres, including about 1,800,000 acres of wheat and 1,300,000 of rye. In addition, large areas damaged during the winter remained untilled owing to various unfavourable circumstances, so that the total given above by no means represents the whole of the harm done. No less than 38 per cent. of the area under winter wheat was ploughed up in Germany, while in Prussia alone, where matters were generally worse than in the south, nearly half the area under this cereal was so treated. Of the rye, clover, and lucerne, about 10 per cent. was ploughed up.

As regards the condition of the crops actually growing at the middle of May, the winter wheat was reported as bad in Prussia, but from average to good in the south, being best in Bavaria. Spring wheat and rye were better than the winter corn, while barley, oats, and meadow hay were between average and good. Winter rye, clover, and lucerne were only average. The crops sown in the spring were, moreover, generally late, and in many instances had not sprouted.

THE GERMAN HARVEST OF 1900.

The annual statistics relating to the principal crops in Germany, which have now been published for the year 1900, are shown in the following table, together with the figures for the previous year.

Crops.	Area.		Production.	
	1900.	1899.	1900.	1899.
	Acres.	Acres.	Qrs.	Qrs.
Wheat	5,061,400	4,980,700	17,637,300	17,666,200
Rye	14,708,800	14,501,500	39,261,800	39,836,400
Barley	4,125,000	4,052,900	16,542,000	16,441,200
Oats	10,183,400	9,879,400	50,098,000	48,620,000
Spelt	783,600	800,600	2,141,300	2,186,100
			Tons.	Tons.
Potatoe	7,950,400	7,734,700	39,933,100	37,867,700
Clover (hay)	4,467,000	4,506,600	6,672,300	8,144,200
Lucerne (hay)	566,700	553,500	1,295,300	1,329,400
Permanent Grass (for hay)	14,602,900	14,542,300	22,744,800	23,385,800

It will be seen from the above figures that, so far as the five cereal crops are concerned, there was, on the whole, no significant change in 1900 either in area or production, though an increase was noticeable in each; the area harvested with cereals being 34,862,200 acres against 34,215,100 acres in 1899, an increase of about 1·9 per cent., while the total production was 125,680,400 qrs., or about 930,000 qrs. more than in the previous year. Proportionately to their area, however, the yield of wheat, rye, and barley was slightly less than in 1899, while that of spelt and oats was the same.

With regard to potatoes, an increase of about 2·8 per cent. may be observed in the area, while the yield per acre was also somewhat greater than in 1897. The quantity of tubers reported to be diseased was 903,300 tons, so that the net yield may be put at about 39 million tons. The yield of hay from clover, lucerne, and permanent grass was in each case below that of the previous year.

SWEDISH HARVEST OF 1900.

According to the Report of the Swedish Statistical Bureau, the harvest of 1900 was fairly good. The cereal crop was probably the largest ever harvested in Sweden, and the potato crop was also large and of a very good quality. With regard to hay, however, the yield was indifferent, though of excellent quality. The estimated production of each of the principal crops is shown below:—

Crop.	1900.	Average, 1890-1899.
	Bushels.	Bushels.
Wheat	5,086,400	4,221,000
Rye	25,204,600	21,583,100
Barley	14,329,400	13,753,000
Oats	67,131,400	61,774,400
Mixed Corn	10,983,000	8,829,700
Peas	1,346,700	1,410,700
Beans	218,300	201,600
Vetches	795,300	700,100
Potatoes	67,770,700	48,807,300

PARLIAMENTARY PUBLICATIONS.

Board of Agriculture. — *Agricultural Returns for* 1900 [*Cd.* 576.] *Price* 1*s.* 4*d.*

This annual volume, comprising 117 tables, together with an explanatory report, brings together, in a form for permanent record, a variety of information for the most part already published by instalments, either separately or in this Journal, as to the acreage and produce of crops, and the numbers of live stock in Great Britain during last year, with similar data for Ireland, the Isle of Man, and the Channel Islands, and with summaries for the whole of the United Kingdom. Comparative statements, tracing the changes shown by the Agricultural Returns of the last third of the nineteenth century, are however added, and incidental tables supply details respecting the trade in live stock with Ireland, the supply of meat and produce at the London markets, the prices of corn and meat, and the quantities and values of the imports and exports of agricultural produce. The volume closes with a series of summaries embodying the leading features which the available statistics of agriculture in the colonies and in foreign countries furnish for comparison with our own.

It is shown that the information as to crops and live stock in Great Britain was abstracted from 516,068 individual schedules, representing the holdings of persons occupying more than one acre, supplemented by the data given in 11,709 schedules from owners of stock who either occupied no land or whose holdings did not exceed one acre.

Of the total area of land and water in Great Britain, which is given as 56,782,000 acres, 48,600,000 acres are accounted for in one form or another, a surface of 588,000 acres being

shown as covered with water, 32,437,000 acres appearing under the various headings which make up the category of cultivated land, 12,900,000 acres, of which nearly three-fourths occur in Scotland, consisting of rough grazings of mountain or heath land, while, according to the special returns last collected in 1895, woods and plantations cover a further area of 2,726,000 acres.

Major Craigie, in his prefatory report, notes the further contraction of the land under the plough in Great Britain and, by means of a diagram, illustrates the annual course of the changes in this direction since 1870, with the more than parallel increase which has occurred in the surface of permanent grass freshly brought into reckoning in the cultivated area, or resulting from the conversion of arable land into pasture.

The returns of the produce of crops, which were briefly summarised in the last number of this Journal, are now shown in full detail for each county, and the yield of the crops of the past season and of each of the last ten years is compared with the estimated average yield over the ten-year period 1891-1900, with comments on the general character of the past season.

In the returns of live stock here given it is noted how slight was the total increase in cattle in 1900, while horses, sheep, and pigs all showed a more or less distinct decrease on the preceding year.

The prices of corn and meat in the past year are compared in the report with the corresponding data for previous seasons, the level of the grain prices showing a slight increase in both wheat and oats, and a slight decrease in barley. As regards meat, the data now available in various forms is found to indicate the prevalence of a higher level of values than in the preceding twelve months.

The report refers also in detail to the numerous tables of imports of agricultural produce for a long series of years which are placed for convenient reference in this annual volume. Attention is drawn to the changes which the sources of our imports of wheat have undergone in the past year, and in the previous decade, the large augmentation of

the Argentine total since 1890 placing the South American Republic second only to the United States as an exporter of wheat to the United Kingdom, and the contributions of India practically disappearing under the exceptional circumstances of the latest season.

The relative increase in the several descriptions of seaborne food between 1866-70 and 1896-1900 is the subject of a special table, which serves to emphasise the growth of foreign meat supplies from 4·2 lbs. to 43·9 lbs. per head of the population of this country.

The tabular summaries of colonial and foreign agricultural statistics offered in the volume show that only in ten out of the twenty-five countries quoted can estimates of wheat areas and production be given for 1900. Only in eight instances has a consecutive five years' review (ending with 1899) of the numbers of live stock been found to be possible.

The report includes, however, a notice of the most recent movements reported in the several countries whence continuous statistics are supplied, and comparisons are made respecting the relative yield per acre attained in respect of cereal produce in this country and elsewhere, which deserve attentive study as illustrating the high level of production maintained in the United Kingdom in contrast with her most active competitors abroad. A five years' retrospect of the growth or diminution of cattle and sheep in the United Kingdom, and such other States as render an annual account of their herds and flocks, makes our increase in cattle 4½ per cent. against one of only 3 per cent. in France, while reductions more or less distinct are reported from the United States, Australasia, and the Cape. In sheep the record continues also favourable to our own country, although the decline, which the flocks of the United States till recently showed, is now shown to have again given place to an increase.

Board of Agriculture.—Annual Report of Proceedings under the Tithe and other Acts administered in the Land Division for the year 1900. [*Cd.* 502.] *Price*, 2½d.

The total number of applications to the Board under the various Tithes Acts was 994 in 1900, as compared with 1,134 in 1899, a decrease due to a falling off in the applications for the redemption of tithe rent charge. It was anticipated that the change of procedure, whereby the compulsory redemption is carried out by the Board's own officers, would bring about this result; but further experience has confirmed the opinion that the undoubted advantages procured thereby afford sufficient compensation even for a decrease in the rate at which tithe rent charge is being extinguished. The number of redemptions completed in this manner shows a satisfactory advance, and such cases are found to be carried out both more expeditiously and with less friction than appears possible where valuers are employed.

The greater activity in the enfranchisement of copyhold land under the Copyhold Act, 1894, which was apparent in the years 1898 and 1899, appears to be declining; but the number of enfranchisements confirmed in the year 1900, viz., 351, was still well in advance of the figures prior to 1898.

The Board had under consideration applications for Provisional Orders for: (1) the inclosure of the Open Fields and the Heath and Wastes, in all about 610 acres, in the parish of Sutton, Northamptonshire; (2) the regulation of the Common, 826 acres, and the inclosure of the Open Fields, 321 acres, in the parish of Skipwith, in the East Riding of Yorkshire; and (3) the regulation of the Commons, about 400 acres, at Chipping Sodbury, Old Sodbury, and Little Sodbury, Gloucestershire. The Board were satisfied, after holding local inquiries, that in each case the proposed proceedings would be expedient, regard being had to the benefit of the neighbourhood as well as the private interests, and accordingly framed Provisional Orders with respect to the Sutton and the Skipwith lands; but they have not yet been able, after protracted negotiations, to settle in a satisfactory

manner the terms and conditions on which an Order for the regulation of the Sodbury Commons should be drawn.

Schemes under Part I. of the Commons Act, 1899, for the regulation and management of Commons with a view to their improvement and preservation as open spaces, were made by the District Councils concerned, and approved by the Board in eight cases. A scheme with respect to Petersham Common, 17 acres in extent, in the parish of Petersham and borough of Richmond, Surrey, certified by the Board in 1899, was confirmed by the Metropolitan Commons (Petersham) Supplemental Act, 1900, and the Common is now under the management and control of a body of conservators, appointed in part by the Corporation of Richmond, in part by the vestry of Petersham, and in part by the lord of the manor. Two schemes, relating respectively to Orpington Commons, Kent, and to Ham Common, Surrey, were approved and certified by the Board in 1900. Both schemes require confirmation by Parliament in order to have operation. The Board also had under consideration the question as to certifying a scheme with respect to Ham Fields, which lie between Ham Common on the east and the River Thames on the west, and contain over 200 acres. Objections to the proposed scheme were made on several grounds, and, regard being had to the objects for which a scheme may be made, the Board came to the conclusion that the case was not one to which the provisions of the Metropolitan Commons Acts could reasonably or conveniently be applied.

Under the Universities and College Estates Acts, 130 applications were received and the Board's consent was given in 118 cases, having an aggregate value of £258,587. Under the Glebe Lands Act, 1888, 80 applications were made for the Board's approval of the sale of 2,563 acres of glebe land; the sales actually completed in the year were 74 in number, comprising 1,470 acres, for which £98,060 was paid. The applications under the Drainage and Improvement of Land Acts numbered 219, and the total sum for which sanction was asked was £206,387.

The promoters respectively of the Witney, Burford, and Andoverford Light Railway, in Oxfordshire and Gloucester-

shire, and of the Cranbrook and Tenterden Light Railway, in Kent, being desirous of obtaining a special advance from the Treasury, applied to the Board for certificates as required by Section 5 (1) of the Light Railways Act. The Board, after due inquiries, were satisfied that the proposed railways would benefit agriculture in their respective districts, but that owing to the exceptional circumstances they would not be constructed without special assistance from the State, and they gave their certificates accordingly.

Annual Local Taxation Returns (England and Wales), 1898-9.

These accounts of the receipts and expenditure of the various local bodies in England and Wales are issued in seven parts,* of which the last forms a summary of the information detailed in the other six. This summary shows that the aggregate receipts (excluding loans) of all these local authorities in 1898-9 were £72,178,419, and the expenditure out of these receipts £71,191,858, both these totals having steadily increased during the last five years.

The chief item in the receipts was rates, which amounted to £38,602,673, equivalent to 4s. 9·9d. in the pound on the rateable value, or £1 4s. 7d. per head of the estimated population. The metropolitan rate, 5s. 7·6d. in the pound, was considerably above the 4s. 7d., which was the average in the rest of England and Wales. The metropolitan rate was below that of the three previous years.

The poor-rate valuation, on which the above rates are calculated, was £172,065,842 at the beginning of the year. The details of the accounts in connection with the relief of the poor, and of the valuation for poor rate in different unions, are contained in Part I. of these returns. The total

* The numbers and prices of these Parliamentary papers are as follows :—Part I., No. 193, price 11½d.; Part II., No. 324, 7d.; Part III., No. 324, I., 5s. 11 d.; Part IV., No. 324, II., 9d.; Part V., No. 324, III., 7d.; Part VI., No. 324, IV., 6½d.; and Part VII. (summary), No. 324, V., 1s. 2d.

sum raised on account of poor rates was £22,063,539, or 2s. 9d. in the pound. This rate was highest (3s. 5¾d.) in the eastern division of England, and lowest in the northern division, where it averaged 1s. 11¼d. only. Of this sum of £22,063,539, however, considerably more than half was paid as contributions required by precepts to other local authorities—principally as payments for county, borough, and police rates—the amount raised for the purposes of the poor-law authorities being £9,273,805 only, of which again some portion was devoted to purposes partly or wholly unconnected with poor relief. The gross expenditure immediately connected with this relief was £11,286,973; of this sum "receipts in aid" represented £2,667,871, leaving £8,619,102 (including salaries, but excluding the maintenance of pauper lunatics) as the net expenses, directly connected with relief, borne by the poor rate.

The most important of the other items contributing to the receipts of local authorities were £6,570,343 from the Local Government Board out of the Local Taxation Account; £1,332,091 out of Estate Duty under the Agricultural Rates Act, 1896; Treasury subventions amounted to £3,888,524; tolls, dues, and duties, to £3,893,260; revenue from waterworks to £3,480,035, and from gasworks to £5,407,329, various smaller items making up the total. The main heads of expenditure (other than poor relief) were £8,244,961 on education, and £8,443,996 on highways and their maintenance; £7,186,556 on water, gas, and sewerage works; £5,037,636 on police, etc., etc.; while £14,706,246 represented payments in respect of principal and interest of loans.

Of the receipts more intimately connected with agriculture during the year 1898-9, it may be noted that market rents, tolls, stallages, etc., yielded £823,232; slaughterhouses, £30,683; bridge and ferry tolls, etc., £159,487; small holdings, allotments, and commons, £1,381.

The expenditure, not defrayed out of loans, includes a sum of £43,239 under the Contagious Diseases (Animals) Acts. Sewerage and sewage disposal works cost £1,716,518; markets and fairs, £396,332; bridges and ferries, £273,474; slaughter-houses, £21,773; land drainage, etc., £298,686.

Rents of allotments amounted to £48,523; the expenses under this head to £46,295. Most of the transactions concerning these allotments were in the hands of parish councils; the receipts of these bodies (including parish meetings) from this source amounting in the year under review to £31,224, and their expenses to £29,432; the corresponding receipts in 1895-6 having been £9,506, and the expenditure £12,000. The various urban authorities spent £12,501 on allotments in 1898-9, and the rural and county councils £4,362. In addition to these expenses, there was raised during the year a sum of £4,214 in loans (nearly five-sixths by county councils) for this purpose, and there was an expenditure of £1,768 defrayed out of loans.

It may be noted that the total amount of loans raised during 1898-9 by all local authorities for all purposes was £19,698,918, or about £5,821,000 above the average of the four preceding years; the total amount outstanding at the end of the year was £276,229,048, this indebtedness having steadily increased during the past ten years.

Report of the Committee of Council for Education in Scotland, 1900-1 [*Cd.* 585.] *Price* 4*d.*

This Report furnishes particulars of the grants made in respect of agricultural education in Scotland during the financial year 1900-1. The usual sum of £2,000 which the Department receives annually for the purpose was augmented in the past year by moneys available under Section 2, Subsection 4, of the Local Taxation Account (Scotland) Act, 1898, and the following grants were made: £500 to the Agricultural Department of Aberdeen University; £1,000 to the Edinburgh School of Rural Economy; and £2,000 to the West of Scotland Agricultural College.

It is explained that the object of these special agricultural grants is in the first place to foster the scientific study of

agriculture to the highest possible degree by a comparatively select body of students, and in the second place to make the results of scientific research known as widely as possible among the farming community by suitable agencies, in order to ensure that this expenditure of public funds shall be a direct benefit to the agriculture of the country.

The Report states that the successful establishment of the West of Scotland Agricultural College has led to a movement for a similar organisation for agricultural teaching and research in the south-east of Scotland. Negotiations are now in progress upon the principle that financial aid from Imperial and national funds must, to a large extent, be dependent upon the appreciation of the work in the various localities concerned, as evidenced by continued local support. The committee think that the most effective way of securing such support as well as of ensuring that the work of each institution shall take the direction most likely to be productive of benefit to the locality, is to entrust its executive management to a body of governors thoroughly representative of the most enlightened opinion on agricultural subjects among both farmers and landowners. To the bodies of governors so constituted the Board would look for advice in all that concerns agricultural education in the districts affected, and they hope ultimately to have at least three such organisations affecting wide districts of Scotland, and affording aid to the agriculture of the district in the form best suited to it.

Congested Districts Board for Scotland.—Report for the year ending 31*st March*, 1901. [*Cd.* 553.] *Price* 6½*d.*

During the year the Commissioners had under consideration various proposals for acquiring land both for migration from congested districts to other parts of Scotland, and also for the settlement of crofters and cottars in holdings near their present abodes within the congested area, and the schemes, which were approved of, promise, it is stated, to

provide good holdings of various sizes for the occupiers, and they afford in many cases opportunity for the relief of congestion by the allocation among other tenants of the lands previously in occupation.

The Board also continued, on the lines which were found to be satisfactory in 1899-1900, the distribution at reduced prices of seed potatoes and oats of the finest quality, and in this way 176½ tons of potato seed and 4,644 bushels of oats were disposed of.

The efforts made to improve the quality of stock by the introduction of high-class stallions, bulls, and rams are stated to be appreciated, and during the year eighty-three rams, forty-five bulls, and three stallions were purchased for this purpose; premium grants were also made for seventeen stallions belonging to other owners.

With regard to poultry, the Board have distributed high-class cockerels and pullets in places where the co-operation of poultry-keepers could be secured to assist in improving the breed of fowls in the neighbourhood. Some sittings of pure-bred eggs were also distributed.

Experiments in potato spraying were continued with satisfactory results, and a practical effort to show potato growers in Lewis the advantages of culture in wide drills and well-separated sets is expected to have a good result.

In the course of the year the Board voted £20,893 in aid of the construction of a number of marine works, such as breakwaters and piers, of roads and paths, and some miscellaneous works.

PRICES OF LIVE STOCK RETURNED UNDER THE WEIGHING OF CATTLE ACT.

The number of cattle entering the markets at the places scheduled under the Markets and Fairs (Weighing of Cattle) Act, 1891, during the first quarter of 1901 was 271,825, or practically the same as in the corresponding quarter of last year, but the number of sheep showed some diminution, while that of swine reverted to about the same level as in 1899. A slight advance in the proportion of cattle returned as weighed has again to be recorded, but the public use of the weighbridge in the sales of either sheep or swine is still exceptional.

Animals.	1st Quarter, 1901.	1st Quarter, 1900.
CATTLE:	No.	No.
Entering markets - - - -	271,825	271,069
Weighed - - - - - -	38,459	36,034
Prices returned - - - - -	32,837	32,668
Prices returned with quality distinguished - - - - -	27,397	27,743
SHEEP:		
Entering markets - - - -	724,286	732,312
Weighed - - - - - -	9,218	9,665
Prices returned with quality distinguished - - - - -	8,168	8,643
SWINE:		
Entering markets - - - -	109,336	124,639
Weighed - - - - - -	483	420
Prices returned with quality distinguished - - - - -	483	348

At Birmingham, Lincoln, and York the weighbridge does not appear to have been used during the quarter, and from

Ashford, Norwich, and Salford—although a few animals have been weighed—no information as to prices is forthcoming.

There are, however, thirteen of the twenty-one scheduled markets which continue to supply prices of a sufficient number of animals to give returns of average prices for the three months in sufficiently reliable form for comparison. The results as ascertained at these places appear below.

Places.	Inferior or Third Quality.			Good or Second Quality.			Prime or First Quality.		
	Number.	Price per Stone	Price per Cwt.	Number	Price per Stone	Price per Cwt.	Number.	Price per Stone	Price per Cwt.
		s. d.	s. d.		s. d.	s. d.		s. d.	s. d.
Carlisle	545	3 5¾	27 10	917	3 10¾	31 2	1,905	4 3½	34 4
Leicester	—	—	—	67	3 9	30 0	201	4 3½	34 4
Leeds	5	3 6	28 0	97	3 8¼	29 6	276	4 3½	34 4
Liverpool	176	3 2½	25 8	275	3 8¼	29 6	1,620	4 4¾	35 2
London	1	3 1½	25 0	426	4 4½	35 0	878	4 10¼	38 10
Newcastle	—	—	—	52	4 1½	33 0	889	4 7¾	37 2
Shrewsbury	138	3 9½	30 4	168	4 1½	33 0	104	4 4½	35 0
Aberdeen	1,384	3 2¾	25 10	2,219	4 2½	33 8	2,369	4 6½	36 4
Dundee	531	3 4½	27 0	1,362	4 4¼	34 10	605	4 7¾	37 2
Edinburgh	—	—	—	3,277	4 5¾	35 10	90	4 8½	37 8
Falkirk	268	4 1	32 8	358	4 4¾	35 2	209	4 7½	37 0
Glasgow	308	4 2¼	33 6	664	4 3¾	34 6	2,228	4 5¼	35 6
Perth	—	—	—	147	4 5¼	35 6	139	4 8¾	37 10

The prices for prime or first quality cattle ranged from 38s. 10d. per cwt. (4s. 10¼d. per stone) in London to 34s. 4d. per cwt. (4s. 3½d. per stone) at Carlisle, Leicester, and Leeds. For second quality the range was from 35s. 10d. per cwt. (4s. 5¾d. per stone) at Edinburgh, to 29s. 6d. per cwt. (3s. 8¼d. per stone) at Leeds and Liverpool. The defective nature of the returns of prices of cattle of inferior grade remains still to be noted.

The following table gives a comparison of the prices per cwt. as shown in the foregoing table with those which were recorded in the corresponding period of last year.

PLACES.	INFERIOR or Third Quality.		GOOD or Second Quality.		PRIME or First Quality.	
	1901.	1900.	1901.	1900.	1901.	1900.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Carlisle - -	27 10	27 4	31 2	31 0	34 4	35 0
Leicester - -	—	—	30 0	30 0	34 4	34 2
Leeds - - .	28 0	28 0	29 6	29 4	34 4	33 4
Liverpool - -	25 8	27 0	29 6	30 10	35 2	36 2
London - -	25 0	26 10	35 0	35 6	38 10	40 0
Newcastle - -	—	—	33 0	36 10	37 2	37 10
Shrewsbury -	30 4	28 8	33 0	32 8	35 0	36 0
Aberdeen - -	25 10	26 8	33 8	34 2	36 4	37 10
Dundee - -	27 0	26 8	34 10	34 2	37 2	36 10
Edinburgh -	—	27 8	35 10	36 2	37 8	37 10
Falkirk - -	32 8	30 8	35 2	34 2	37 0	36 6
Glasgow - -	33 6	32 4	34 6	33 4	35 6	35 10
Perth - -	—	35 10	35 6	35 6	37 10	37 8

Generally speaking, it will be noticed that there is considerable variation in this comparison, prices at some places appearing to have ruled somewhat higher, and at others somewhat lower, than in 1900. By combining the returns from the whole of these thirteen places in one monthly average a closer indication of the general movement of prices is possible.

Months.	Good or Second Quality, per cwt.		Prime or First Quality, per cwt.	
	1901.	1900.	1901.	1900.
	s. d.	s. d.	s. d.	s. d.
January - - - -	34 8	34 8	36 2	37 2
February - - -	34 6	34 6	35 10	36 8
March - - - -	34 2	34 2	36 0	36 0

This seems to show that while the value of second quality cattle has on the whole remained at the same level during

the first three months of 1901 as during the same months of 1900, the quotations for prime cattle were in January and February slightly lower than in the preceding year. In March of both years the value of the prime stock reported on remained the same.

From nine of the scheduled places sales of fat cattle by live weight, *i.e.*, at an agreed price per stone or per cwt., were reported. These transactions were most numerous at Glasgow, where 1,447 prime cattle and 110 of second quality were thus sold during the three months. The prices calculated from sales by actual live weight ranged from 37s. 10d. to 32s. 6d. per cwt. for animals of first quality, and from 36s. 6d. to 31s. 6d. per cwt. for those of second quality.

The practice of weighing store cattle has been for some time systematically adopted at Shrewsbury, and at one or two other places—Edinburgh, Leicester, Aberdeen, and Dundee—it was resorted to in a few instances during the quarter.

The appended table gives the details for each scheduled market of the number of cattle, sheep, and pigs respectively entering, weighed, and priced during the first quarter of 1901.

CATTLE, SHEEP, and SWINE *entering the Markets and Marts of the undermentioned Places, with the Number Weighed, as received from the Market Authorities in the* FIRST QUARTER *of* **1901**, *under the Markets and Fairs (Weighing of Cattle) Act,* 1891 (54 & 55 *Vict. c.* 70).

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Ashford	2,280	38	—	11,653	—	—	5,150	—	—
Birmingham	6,469	—	—	7,899	—	—	54,726	—	—
Bristol	8,433	69	69	15.637	—	—	—	—	—
Carlisle	10,493	3,367	3,367	36,884	—	—	3,834	—	—
Leicester	10,660	373	325	9,882	87	87	1,621	—	—
Leeds	8,298	378	378	23,977	334	334	101	—	—
Lincoln	1,860	—	—	14,961	—	—	3,635	—	—
Liverpool	14,838	2,071	2,071	52,142	284	284	—	—	—
London	17,500	3,492	1,305	115,420	1,003	—	2,110	—	—
Newcastle-upon-Tyne	23,970	941	941	67,724	—	—	11,184	402	402
Norwich	25,080	38	—	40,493	40	—	6,519	—	—
Salford	33,202	1,524	—	90,252	—	—	764	—	—
Shrewsbury	13,099	2,446	2,341	8,057	—	—	7,298	—	—
Wakefield	18,012	1,615	110	40,125	—	—	546	7	7
York	16,611	—	—	18,881	—	—	1,762	—	—
SCOTLAND.									
Aberdeen	11,769	5,998	5,998	12,787	6,155	6,155	2,891	—	—
Dundee	4,213	2,512	2,512	5,317	1,039	1,039	613	—	—
Edinburgh	15,260	7,303	*3,659	53,716	—	—	2,448	—	—
Falkirk	2,077	835	835	1,966	—	—	29	—	—
Glasgow	17,854	3,377	3,200	62,693	19	12	1.332	6	6
Perth	9,847	2,082	*286	33,820	257	257	2,773	68	68
TOTAL for ENGLAND	210,805	16,352	10,907	553,987	1,748	705	99,250	409	409
TOTAL for SCOTLAND	61,020	22,107	*16,490	170,299	7,470	7,463	10,086	74	74
Total	271,825	38,459	*27,397	724,286	9,218	8,168	109,336	483	483

* Prices for 3,644 cattle in addition to the above were quoted from Edinburgh and for 1,79 cattle from Perth, but without distinguishing the quality.

PRICES OF MEAT, CORN, AND DAIRY PRODUCE.

AVERAGE PRICES of DEAD MEAT, per Stone of 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the First Quarter of 1901, and during the Months of March, April, and May, 1901.

(*Compiled from the prices quoted weekly in the Meat Trades' Journal.*)

DESCRIPTION.	1ST QUARTER 1901.	MARCH 1901.	APRIL 1901.	MAY 1901.
BEEF :—	*s. d. s. d.*	*s. d. s. d.*	*s. d. s. d.*	*s. d. s. d.*
Scotch, short sides	4 1 to 4 4	4 0 to 4 3	4 1 to 4 4	4 2 to 4 5
,, long sides	3 10 ,, 4 1	3 9 ,, 4 0	3 11 ,, 4 1	3 11 ,, 4 2
English	3 9 ,, 3 11	3 8 ,, 3 10	3 10 ,, 4 0	3 9 ,, 3 11
Cows and Bulls	2 1 ,, 3 2	2 0 ,, 3 1	2 0 ,, 3 1	2 0 ,, 3 2
American Birkenhead killed	3 6 ,, 3 9	3 5 ,, 3 7	3 8 ,, 3 9	3 6 ,, 3 7
,, Deptford killed	3 7 ,, 3 10	3 6 ,, 3 8	3 8 ,, 3 11	3 6 ,, 3 8
American Refrig. hind-quarters	3 6 ,, 3 9	3 3 ,, 3 6	3 7 ,, 3 9	3 6 ,, 3 8
,, ,, fore-quarters	2 8 ,, 2 9	2 6 ,, 2 8	2 7 ,, 2 10	2 3 ,, 2 5
Australian, Frozen hind-quarters	2 4 ,, 2 5	2 2 ,, 2 4	2 1 ,, 2 4	2 4 ,, 2 5
,, ,, fore-quarters	2 2 ,, —	2 0 ,, 2 1	2 0 ,, 2 1	1 11 ,, —
New Zealand ,, hind-quarters	2 6 ,, 2 7	2 5 ,, 2 6	2 5 ,, 2 6	2 6 ,, 2 7
,, ,, fore-quarters	2 2 ,, —	2 1 ,, 2 2	2 2 ,, —	2 1 ,, —
River Plate ,, hind-quarters	2 5 ,, 2 6	2 5 ,,	2 5 ,, —	2 5 ,, —
,, ,, fore-quarters	2 2 ,, 2 3	2 1 ,, —	2 ,, —	2 1 ,, 2 2
MUTTON :—				
Scotch, Prime	4 8 ,, 5 0	4 11 ,, 5 2	4 8 ,, 5 0	4 8 ,, 5 2
English, Prime	4 6 ,, 4 11	4 9 ,, 5 1	4 5 ,, 4 9	4 4 ,, 4 10
Ewes	3 7 ,, 4 1	3 10 ,, 4 3	3 7 ,, 4 0	3 6 ,, 3 11
Continental	4 3 ,, 4 8	4 7 ,, 4 10	4 3 ,, 4 7	4 4 ,, 4 7
New Zealand, Frozen	2 7 ,, 3 3	2 5 ,, 3 0	2 2 ,, 3 0	1 9 ,, 2 10
Australian, Frozen	2 5 ,, 2 7	2 2 ,, 2 4	1 10 ,, 2 0	1 7 ,, 1 8
River Plate, Frozen	2 6 ,, 2 8	2 4 ,, —	2 2 ,, —	1 10 ,, 1 11
LAMB :—				
English	6 9 ,, 7 7	6 9 ,, 7 7	6 8 ,, 7 6	6 1 ,, 7 5
New Zealand, Frozen	4 0 ,, 4 4	3 11 ,, 4 2	3 5 ,, 3 10	3 2 ,, 3 8
VEAL :—				
English	4 10 ,, 5 1	5 0 ,, 5 2	4 7 ,, 4 11	4 6 ,, 4 10
Foreign	4 2 ,, 4 8	4 1 ,, 4 10	3 8 ,, 4 5	3 9 ,, 4 4
PORK :—				
English, best	4 2 ,, 4 7	4 4 ,, 4 8	4 2 ,, 4 8	4 1 ,, 4 6
,, secondary } Foreign }	3 7 ,, 4 0	3 8 ,, 4 2	3 5 ,, 3 11	3 7 ,, 3 11

AVERAGE WHOLESALE PRICES of CATTLE and SHEEP, per Stone of 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during the under-mentioned Quarters of 1900 and 1901.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1st Quarter, 1900	2 11	4 1	4 9	3 5	5 1	5 10
2nd Quarter, ,,	3 1	4 1	4 9	3 5	5 7	6 4
3rd Quarter, ,,	3 2	4 3	4 11	3 3	5 4	6 0
4th Quarter, ,,	2 11	4 2	4 10	3 2	5 1	5 10
1st Quarter, 1901	2 4	3 11	4 7	3 4	5 2	6 0

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per Stone of 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during the under-mentioned Quarters of 1900 and 1901.

PERIOD.	LIVERPOOL.*		GLASGOW.†	
	BEEF.	MUTTON.	BEEF.	MUTTON.
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
1st Quarter, 1900	2 6 to 4 0	4 0 to 5 6	3 2 to 4 2	4 4 to 5 4
2nd Quarter, ,,	2 10 ,, 4 2	4 0 ,, 5 8	3 6 ,, 4 0	4 10 ,, 5 10
3rd Quarter, ,,	2 8 ,, 4 0	3 4 ,, 5 0	3 0 ,, 3 10	4 0 ,, 4 10
4th Quarter, ,,	2 8 ,, 3 10	3 0 ,, 4 10	3 0 ,, 3 10	3 0 ,, 4 8
1st Quarter, 1901	2 8 ,, 3 11	3 6 ,, 5 4	3 0 ,, 3 10	4 4 ,, 5 4

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals *slaughtered at the Liverpool Abattoir*, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College, Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE and SHEEP (First Quality Dead Weight) in the BERLIN CATTLE MARKET in the under-mentioned Months of 1901.

MONTH.	CATTLE. Per Cwt.	SHEEP. Per Cwt.
1901.	s. d. s. d.	s. d. s. d.
March	63 2 to 66 2	60 1 to 63 2
April	62 9 ,, 66 2	59 9 ,, 62 9
May	62 1 ,, 65 8	59 1 ,, 62 1

NOTE.—The above prices have been compiled from the weekly returns published in the *Deutsche Landwirtschaftliche Presse.*

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality) in the PARIS CATTLE MARKET in the under-mentioned Months of 1901.

MONTH.	OXEN. Per Cwt.	CALVES. Per Cwt.	SHEEP. Per Cwt.	PIGS. Per Cwt.
LIVE WEIGHT.				
1901.	s. d.	s. d.	s. d.	s. d.
March	28 6	43 4	34 6	35 0
April	29 1	43 11	34 9	35 8
May	30 0	45 3	35 1	37 2
DEAD WEIGHT.				
1901.	s. d.	s. d.	s. d.	s. d.
March	48 1	72 3	69 0	49 9
April	48 10	73 4	69 8	50 8
May	50 2	76 4	70 3	8

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique.*

CHICAGO.

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1901.

Month.	Good Dressed Beef and Shipping Steers.					Export Cattle.					Extra Prime Cattle.				
	s.	*d.*		*s.*	*d.*	*s.*	*d.*		*s.*	*d.*	*s.*	*d.*		*s.*	*d.*
March - -	22	4	to	26	6	22	10	to	27	5	28	3	to	28	11
April - -	23	10	,,	26	9	23	10	,,	27	6	28	6	,,	29	2
May - . -	23	11	,,	26	4	23	10	,,	27	6	28	2	,,	28	8

Compiled from the Live Stock Reports issued by Messrs. Clay, Robinson, and Co., of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in the under-mentioned Quarters of 1900 and 1901.

(*Computed from the Trade and Navigation Accounts.*)

PERIOD.	BEEF.				MUTTON.		PORK.				BACON.		HAMS.	
	Fresh.		Salted.		Fresh.		Fresh.		Salted.					
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
1st Quarter, 1900 -	39	6	27	11	31	4	42	10	24	9	37	1	45	0
2nd Quarter, ,, -	40	1	26	11	36	3	43	0	24	8	41	6	46	7
3rd Quarter, ,, -	39	1	25	10	34	6	42	1	22	10	43	7	47	10
4th Quarter, ,, -	39	7	26	1	36	4	43	7	25	2	44	10	47	5
1st Quarter, 1901 -	40	9	25	8	37	9	43	2	27	10	45	1	46	8

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1901, 1900, and 1899.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1901.	1900.	1899.	1901.	1900.	1899.
Wheat.						
	s. d.	*s. d.*	*s. d.*	*Quarters.*	*Quarters.*	*Quarters.*
Lady Day - - -	26 3	25 11	26 3	744,018	868,378	868,579
Midsummer - - -	—	25 9	25 1	—	854,497	994,293
Michaelmas - - -	—	28 7	25 2	—	511,347	754,667
Christmas - - -	—	27 4	26 4	—	689,261	913,421
Barley.						
	s. d.	*s. d.*	*s. d.*	*Quarters.*	*Quarters.*	*Quarters.*
Lady Day - - -	25 3	25 1	27 1	844,616	888,949	830,398
Midsummer - - -	—	24 3	24 6	—	93,157	92,648
Michaelmas - - -	—	24 5	24 4	—	143,552	237,935
Christmas - - -	—	25 11	26 6	—	2,065,135	2,135,762
Oats.						
	s. d.	*s. d.*	*s. d.*	*Quarters.*	*Quarters.*	*Quarters.*
Lady Day - - -	17 6	16 7	16 11	236,316	246,949	251,841
Midsummer - - -	—	18 2	17 6	—	110,163	137,834
Michaelmas - - -	—	18 7	17 3	—	116,880	147,902
Christmas - - -	—	17 0	16 4	—	237,791	238,783

* Section 8 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local inspector of Corn Returns in any other measure than the imperial bushel, or by weight or by a weighed measure, that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 39 imperial pounds for every bushel of oats.

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1901, and in the corresponding Weeks in 1900 and 1899.

Weeks ended (*in 1901*).	Wheat.			Barley.			Oats.		
	1901.	1900.	1899.	1901.	1900.	1899.	1901.	1900.	1899.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Jan. 5 -	26 5	25 9	27 0	25 4	25 7	28 3	17 2	16 2	17 0
,, 12 -	26 7	25 11	27 2	25 6	25 5	28 2	17 3	16 3	17 1
,, 19 -	26 11	26 0	27 0	25 9	25 8	27 11	17 3	16 2	17 1
,, 26 -	26 10	25 10	26 7	25 6	25 9	27 9	17 6	16 4	17 0
Feb. 2 -	26 7	25 8	26 6	25 7	25 4	27 2	17 8	16 6	17 0
,, 9 -	26 8	25 10	26 8	25 7	25 3	27 2	17 7	16 5	17 0
,, 16 -	26 4	26 1	26 0	25 4	24 11	26 10	17 7	16 8	16 11
,, 23 -	26 1	26 3	25 7	25 0	25 1	26 7	17 7	16 9	16 11
Mar. 2 -	25 11	26 4	25 8	25 0	24 6	26 7	17 9	16 10	17 0
,, 9 -	25 9	25 11	25 10	25 4	24 8	26 7	17 7	16 11	16 11
,, 16 -	25 9	25 10	25 10	25 1	24 6	26 3	17 7	16 11	16 10
,, 23 -	25 8	25 11	25 4	24 11	25 0	26 8	17 9	17 1	17 0
,, 30 -	26 0	25 10	24 11	24 9	24 11	26 2	18 0	17 2	16 11
Apl. 6 -	26 3	25 10	24 7	25 3	24 10	25 1	18 0	17 2	16 11
,, 13 -	26 5	25 11	24 6	26 0	24 5	25 7	18 1	17 8	16 10
,, 20 -	26 8	26 0	24 8	25 7	24 9	25 2	18 8	17 3	17 1
,, 27 -	26 8	26 0	25 0	25 8	25 2	25 10	18 8	17 11	17 5
May 4 -	26 9	25 11	25 3	26 4	25 3	24 5	19 1	18 0	17 6
,, 11 -	27 3	25 11	25 4	26 2	24 10	23 11	19 1	17 11	17 9
,, 18 -	27 7	25 7	25 3	24 2	24 5	23 11	19 4	18 5	17 10
,, 25 -	27 7	25 5	25 2	24 1	23 11	23 8	19 8	18 2	17 8
June 1 -	27 7	25 5	25 4	23 8	24 4	24 4	19 9	18 6	18 1
,, 8 -	27 6	25 3	25 6	22 9	23 8	21 10	20 1	18 8	18 2
,, 15 -	27 8	25 6	25 7	24 0	23 8	23 1	19 7	18 11	17 10
,, 22 -		25 9	25 7		23 5	26 2		18 11	17 11
,, 29 -		26 11	25 7		23 4	24 2		19 3	18 0
July 6 -		27 10	25 7		22 10	21 9		19 5	18 1
,, 13 -		28 7	25 5		23 2	20 4		19 1	17 11
,, 20 -		29 0	25 5		23 8	21 10		19 3	18 0
,, 27 -		29 3	25 2		24 4	22 5		19 9	18 2
Aug. 3 -		28 10	24 10		23 10	20 9		19 4	18 0
,, 10 -		28 7	24 8		23 7	22 6		19 8	17 9
,, 17 -		28 10	24 7		23 3	26 11		19 11	17 4
,, 24 -		28 10	24 7		24 10	26 5		18 8	17 1
,, 31 -		28 8	25 0		25 2	25 10		18 1	16 7
Sept. 7 -		28 7	25 5		25 8	26 5		17 10	16 6
,, 14 -		28 4	25 4		25 4	27 1		17 1	16 2
,, 21 -		28 4	25 4		26 0	27 4		17 1	16 1
,, 28 -		28 9	25 6		26 1	26 11		17 2	16 5
Oct. 5 -		28 9	26 0		26 2	28 0		16 10	16 5
,, 12 -		28 9	27 3		26 2	27 9		17 1	16 5
,, 19 -		28 4	28 2		26 5	27 6		16 11	16 10
,, 26 -		27 11	28 1		26 3	27 4		16 11	16 3
Nov. 2 -		27 5	27 2		26 3	27 2		16 11	16 7
,, 9 -		27 3	26 7		25 11	26 9		16 10	16 5
,, 16 -		27 1	26 1		25 8	26 4		17 1	16 7
,, 23 -		27 2	25 8		25 10	26 2		17 0	16 7
,, 30 -		27 0	25 7		25 9	25 10		17 2	16 6
Dec. 7 -		26 10	25 7		25 11	25 10		17 4	16 5
,, 14 -		26 9	25 4		25 7	25 7		17 1	16 1
,, 21 -		26 7	25 6		25 7	25 10		17 2	16 0
,, 28 -		26 4	25 9		25 10	25 5		17 2	16 2

AVERAGE PRICES of WHEAT, BARLEY, and OATS, per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1901.

Month.	Wheat.	Barley.	Oats.
1901.	*s.* *d.*	*s.* *d.*	*s.* *d.*
February - - - - -	28 5	22 9	18 5
March - - - - -	28 2	22 11	18 8
April - - - - -	28 8	23 0	18 11

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge.*

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES, in the under-mentioned Months of 1901.

MONTH.	FRANCE.	ENGLAND.
WHEAT.		
1901.	Per Qr. *s.* *d.*	Per Qr. *s.* *d.*
March - - - - - - -	32 11	25 9
April - - - - - - -	32 9	26 6
May - - - - - - -	32 11	27 3
BARLEY.		
1901.	Per Qr. *s.* *d.*	Per Qr. *s.* *d.*
March - - - - - - -	23 0	25 0
April - - - - - - -	23 1	25 7
May - - - - - - -	23 1	25 2
OATS.		
1901.	Per Qr. *s.* *d.*	Per Qr. *s.* *d.*
March - - - - - - -	20 5	17 8
April - - - - - - -	20 9	18 4
May - - - - - - -	21 4	19 3

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique.* The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER at the under-mentioned Markets in the under-mentioned Months of 1901.

Month.	London.	Paris.	Breslau.
	WHEAT.		
1901.	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d. s. d.
March - - - - - -	26 10	33	30 1 to 33 10
April - - - - - -	27 3	33 4	32 3 ,, 35 11
May - - - - - -	28 3	33 10	34 11 ,, 38 7
	BARLEY.		
1901.	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d. s. d.
March - - - - - -	26 5	23 1	24 4 to 27 8
April - - - - - -	24 2	22 8	24 9 ,, 28 0
May - - - - - -	27 8	22 7	24 9 ,, 28 0
	OATS.		
1901.	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d. s. d.
March - - - - - -	18 5	20 7	18 10 to 19 6
April - - - - - -	19 1	21 2	19 11 ,, 20 8
May - - - - - -	19 6	21 11	20 6 ,, 21 2

Note.—The London quotation represents the price of British corn as returned under the Corn Returns Act, 1882; the price of grain in Paris is the official average price of French grain in that city; the quotations shown for Breslau represent the prices of grain of good merchantable quality.

PRICES OF WOOL.

AVERAGE PRICES of ENGLISH WOOL, per pack of 240 lbs., in the under-mentioned Months of 1901.

(*Compiled from the Economist.*)

DESCRIPTION.	March, 1901.	April, 1901.	May, 1901.
	£ s. £ s.	£ s. £ s.	£ s. £ s.
South Down - -	7 4 to 10 4	7 0 to 10 0	7 0 to 9 10
Half-breds - - -	6 10 ,, 7 17	6 10 ,, 7 15	6 10 ,, 7 10
Leicester - - -	6 0 ,, 6 11	6 0 ,, 6 10	5 10 ,, 6 5
Kent Fleeces - -	6 0 ,, 6 15	6 0 ,, 6 15	5 10 ,, 6 18

AVERAGE WHOLESALE PRICES of BUTTER, MARGARINE, and CHEESE in the under-mentioned Months of 1901.

(*Compiled from the Grocer.*)

DESCRIPTION.	March, 1901.	April, 1901.	May, 1901.
	Per Cwt.	Per Cwt.	Per Cwt.
BUTTER :	s. d. s. d.	s. d s. d.	s. d. s. d.
Cork, 1sts - -	108 6 —	101 6 —	89 6 —
,, 2nds - -	103 0 —	87 6 —	85 0 —
,, 3rds - -	92 0 —	81 6 —	81 6 —
,, 4ths - -	— —	70 6 —	— —
* Irish Creamery -	104 6 to 107 6	95 6 to 99 6	93 0 to 96 6
Friesland - -	97 6 ,, 101 0	96 0 ,, 99 0	96 0 ,, 98 6
Dutch Creameries -	101 6 ,, 104 6	98 0 ,, 101 0	94 6 ,, 98 6
French Baskets -	111 0 ,, 115 0	109 0 ,, 114 0	100 6 ,, 105 0
,, Crocks and Firkins -	99 0 ,, 107 0	97 6 ,, 105 0	90 6 ,, 96 6
,, 2nds and 3rds	93 0 ,, 97 0	91 6 ,, 95 6	84 6 ,, 88 6
Danish and Swedish -	109 0 ,, 112 6	106 6 ,, 109 0	103 0 ,, 105 0
Finnish - -	— —	87 6 ,, 99 6	86 0 ,, 99 0
Russian and Siberian -	84 0 ,, 99 0	83 6 ,, 95 0	84 0 ,, 94 6
Canadian and States -	70 0 ,, 95 0	70 0 ,, 88 0	— —
Argentine - -	91 0 ,, 103 0	87 6 ,, 100 0	— —
Colonial, fine - -	97 0 , 104 6	96 0 ,, 102 0	95 0 101 6
,, good and inferior -	79 0 ,, 94 0	78 0 ,, 91 0	75 0 ,, 90 0
	Per Doz.	Per Doz.	Per Doz.
Fresh Rolls (Foreign)	10 6 to 15 0	10 9 to 14 9	10 0 ,, 13 0
	Per Cwt.	Per Cwt.	Per Cwt.
MARGARINE - -	36 0 to 56 0	36 0 to 56 0	35 6 ,, 54 6
CHEESE :			
Cheddar - -	58 0 ,, 74 0	55 0 ,, 74 0	50 0 ,, 74 0
,, Loaf -	68 6 ,, 71 0	70 0 ,, 74 0	70 0 ,, 74 0
Cheshire - -	80 0 ,, 84 6	— —	— —
Wiltshire, Loaf -	68 0 ,, 70 0	68 0 ,, 70 0	68 0 ,, 70 0
Double Gloucester -	60 0 ,, 63 6	58 6 ,, 64 0	61 6 ,, 64 0
Derby, Factory -	56 0 ,, 60 0	55 0 ,, 60 0	53 0 ,, 60 0

* These prices are the averages of the official quotations of the Price Committee of the Irish Co-operative Agency at Limerick for the choicest Irish pure Creamery Butter.

WEEKLY PRICES (WHOLESALE) of VEGETABLES and FRUIT at COVENT GARDEN MARKET.

(Compiled from the *Gardeners' Chronicle.*)

Description.	Week ending May 4th.	May 11th.	May 18th.	May 25th.
VEGETABLES—	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
Artichokes, Globe, per doz.	2 0 to 2 6	2 0 to 2 6	2 6 to 3 0	2 0 to 2 6
Asparagus home-grown, per bundle	1 0 „ 5 6	1 0 „ 5 0	1 0 „ 4 0	0 9 „ 4 0
Beans, Channel Islands, new, per lb.	1 3 —	1 0 —	0 8 „ 0 9	0 9 „ 0 10
Beans, Broad in flats	3 6 —	3 6 —	3 6 „ 4 6	3 6 —
Beet, per dozen	0 6 —	0 6 —	0 6 —	0 6 —
Beetroots, per bushel	1 0 „ 1 6	1 0 „ 1 6	1 6 „ 2 0	1 6 „ 2 0
Cabbage, per tally	2 0 „ 4 0	2 0 „ 4 0	2 0 „ 4 0	2 0 „ 4 0
Carrots, per dozen bunches	1 6 —	1 6 „ 2 0	1 6 „ 2 0	1 6 „ 2 0
„ washed, per cwt. bag	2 0 „ 2 6	2 0 „ 2 6	2 0 „ 2 6	2 6 —
Cauliflowers, per doz.	1 0 „ 2 0	1 0 „ 1 6	1 0 1 6	1 0 „ 1 6
Cress, per doz punnets	1 6 —	1 6 —	1 6 —	1 6 —
Cucumbers, per doz.	2 0 „ 3 6	2 9 „ 4 0	2 6 „ 3 6	2 0 „ 3 6
Garlic, per lb.	0 2 —	0 2 —	0 2 —	0 2 —
Horseradish, English, loose, per doz.	1 6 —	1 0 „ 1 6	1 0 —	1 0 —
Leeks, per doz. bunches	1 0 —	1 0 —	1 0 —	0 9 „ 1 0
Lettuces, Cabbage, per doz.	— —	0 8 „ 1 3	0 6 „ 1 0	0 6 „ 1 0
Lettuces Cos. per doz.	2 6 „ 4 0	2 6 „ 4 0	2 6 „ 3 6	2 6 „ 4 0
Mint, natural, per doz. bunches	2 0 „ 4 0	2 0 „ 4 0	1 0 „ 1 6	1 0 „ 1 6
Mushrooms, House, per lb.	0 10 „ 1 0	0 9 „ 0 10	0 9 —	0 8 „ 1 0
Onions, picklers, per sieve	2 0 „ 3 0	2 0 „ 3 0	3 0 „ 5 0	3 0 „ 5 0
„ per case	7 6 „ 8 0	8 0 „ 9 0	6 0 „ 7 0	6 0 —
Parsley, per doz. bunches	1 0 „ 2 0	1 0 „ 1 6	1 0 „ 1 6	1 0 „ 1 6
Peas, Frame, per lb.	1 0 „ 1 3	0 6 „ 0 10	0 8 —	0 6 „ 0 10
„ „ in flats	6 0 —	4 0 „ 6 0	4 0 „ 6 0	3 9 „ 6 0
Potatoes, per ton	90 0 „ 135 0	90 0 „ 135 0	70 0 „ 135 0	70 0 „ 135 0
„ new, per cwt.	10 0 „ 16 0	12 0 „ 14 0	12 0 „ 16 0	12 0 „ 15 0
Radishes, per doz. bunches	0 6 „ 1 0	0 6 „ 0 9	0 4 „ 0 9	0 4 „ 1 0
Rhubarb, Out-of doors per doz. bundles	1 6 „ 2 0	1 0 „ 2 0	1 0 „ 2 0	1 0 „ 2 0
Salad, small, per doz. punnets	1 3 —	1 3 —	1 3 —	1 3 —
Shallots, per lb.	0 2 —	0 2 —	0 2 —	0 2 —
Spinach English, per bushel	1 6 „ 2 0	1 0 „ 1 6	1 0 „ 1 6	1 0 „ 1 6
Tomatoes, English, new, per lb.	1 3 „ 1 6	1 0 „ 1 3	0 9 „ 1 0	0 8 „ 0 10
Turnips, per dozen	1 6 „ 2 0	1 6 „ 2 0	1 6 „ 2 0	1 6 „ 2 0
„ new, per bunch	0 8 —	0 6 —	0 9 —	0 6 „ 0 8
Watercress, per dozen bunches	0 4 „ 0 6	0 4 „ 0 6	0 4 „ 0 6	0 6 „ 0 8
FRUIT—				
Apples, English, large Cookers, per bushel	4 0 „ 7 0	4 0 „ 7 0	— —	— —
„ English Wellington, per bushel	8 0 „ 10 0	8 0 „ 10 0	— —	— —
Cherries, per box	— —	2 0 —	1 3 —	1 3 „ 1 6
Cobnuts, per lb.	0 5½ „ 0 6	0 5 „ 0 6	0 5 —	0 5 —
Cranberries, per case	10 0 —	10 0 —	10 0 —	10 0 —
Grapes, Muscats, home-grown, per lb.	5 0 „ 6 0	4 0 „ 6 0	3 0 „ 4 0	3 0 „ 5 0
„ New Hamburgh, per lb.	2 6 „ 3 6	2 6 „ 4 0	2 6 „ 4 0	2 0 „ 3 0
Peaches, per dozen	10 0 „ 30 0	10 0 „ 36 0	10 0 „ 36 0	9 0 „ 24 0
Pines, each	2 6 „ 4 6	2 6 „ 4 6	2 6 „ 4 6	2 6 „ 4 6
Strawberries, Class A, per lb.	3 0 „ 4 0	3 0 „ 4 0	2 0 „ 3 0	2 0 „ 2 6
„ Class B, per lb.	1 6 „ 2 6	1 6 „ 2 6	1 3 „ 1 9	1 0 „ 1 6

DISEASES OF ANIMALS IN GREAT BRITAIN.

NUMBER of OUTBREAKS of **Foot-and-Mouth Disease** and of **Swine-Fever,** with the Number of CATTLE and SWINE Slaughtered by order of the Board of Agriculture, in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Foot-and-Mouth Disease.		Swine-Fever.	
	OUTBREAKS Confirmed.	ANIMALS Attacked.	OUTBREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	*No.*	*No.*	*No.*
December, 1899 - - -	—	—	358	5,276
March, 1900- - - -	7	99	438	4,980
June, 1900 - - - -	2	24	736	7,600
September, 1900 - - -	7	102	409	2,622
December, 1900 - - -	5	41	357	2,731
March, 1901 - - -	10	652	625	3,165

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax** and **Glanders** in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including **Farcy**).	
	OUTBREAKS Reported.	ANIMALS Attacked.	OUTBREAKS Reported.	ANIMALS Attacked.
	No.	*No.*	*No.*	*No.*
December, 1899 - -	133	202	241	355
March, 1900 - -	140	213	259	486
June, 1900 - - -	163	279	286	461
September, 1900 - -	109	224	315	474
December, 1900 - -	159	240	259	437
March, 1901 - -	163	223	322	571

NUMBER OF CASES of **Rabies** in DOGS in GREAT BRITAIN during each of the under-mentioned periods.

THREE MONTHS ENDED	Number of Cases.
31st December, 1899 . - - -	2
31st March, 1900 - - - - -	—
30th June, 1900 - - - - -	—
30th September, 1900 - - - -	3
31st December, 1900 - - - -	3
31st March, 1901 - - - - -	1

DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever,** with the Number of CATTLE and SWINE Slaughtered by order of the Lord Lieutenant and Privy Council in IRELAND, in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUT-BREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUT-BREAKS Con-firmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	*No.*	*No.*	*No.*	*No.*
December, 1899	—	—	—	28	495
March, 1900	—	—	—	40	702
June, 1900	—	—	—	78	1,394
September, 1900	—	—	—	69	1,036
December, 1900	—	—	—	39	577
March, 1901	—	—	—	64	1,265

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax, Glanders,** and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including **Farcy**).		Rabies. Cases Reported.	
	OUT-BREAKS REPORTED.	ANIMALS ATTACKED.	OUT-BREAKS REPORTED.	ANIMALS ATTACKED.	DOGS.	OTHER ANIMALS.
	No.	*No.*	*No.*	*No.*	*No.*	*No.*
December, 1899	—	—	3	4	7	1
March, 1900	1	6	4	5	7	—
June, 1900	1	1	3	7	4	1
September, 1900	—	—	1	1	1	—
December, 1900	—	—	2	2	5	1
March, 1901	—	—	1	1	1	—

ORDNANCE SURVEY MAPS OF GREAT BRITAIN AND IRELAND.

The Ordnance Survey are issuing a new series of folding pocket maps for England and Wales on the scale of one inch to the mile. The maps are printed in colours on sheets 18 by 12 inches, mounted on canvas, in a cover or flat, price 1s. each. The one-inch map can also be procured at the same price in black and white, showing outline and contours; or in outline, with hills printed either in black or brown: the outline map has recently been revised. These maps are not only useful for general topographical purposes, but should also prove serviceable to cyclists and pedestrians, since they show all roads, indicating their character and whether metalled or not, footpaths, hills, rivers, towns, villages, railway stations, and local boundaries.

Combined one-inch outline maps have also been published of Bath, Birmingham, Bournemouth, Bradford, Brighton and Worthing, Bristol, Chatham, Clovelly, Derby, Dorchester and Portland, Gloucester and Cheltenham, Huddersfield, Leeds, Leicester, Liverpool, London, Manchester, Nottingham, Plymouth, Rugby, Sheffield and the Peak, Warrington, Warwick and Leamington, Weymouth, Winchester, Aberdeen, Dundee, Glasgow, the Isle of Wight, the Lake District of England, the New Forest, and South-East Kent. Additional maps are in course of preparation

These combined maps are based on the revised one-inch map. In most cases they are being published folded in covers, and with the principal roads coloured, at prices varying from 1s. to 1s. 6d.

Cheap maps of counties, groups of counties, or districts are also being published on the ¼-inch scale, with main roads coloured, at 6d. plain, or 9d. if folded in a cover. Kent, Northumberland, and Durham are already published, and maps of counties in the South of England will before long be prepared.

There are agents for the sale of Ordnance Survey Maps in most of the chief towns, and maps can be ordered and indexes, etc., seen at many Head Post Offices, in places where there are no agents. They can also be ordered, through any bookseller, from the Director-General, Ordnance Survey, Southampton; or, in the case of Ireland, from the Officer in Charge, Ordnance Survey, Dublin.

THE "LABOUR GAZETTE."

The "Labour Gazette," the Journal of the Labour Department of the Board of Trade, contains an article each month on the state of employment among agricultural labourers in the various parts of the United Kingdom. Special articles also appear therein from time to time on the rates of wages paid to agricultural labourers, the Hiring Fairs in Great Britain, and on migratory Irish agricultural labourers. The "Labour Gazette" is issued on the 15th of each month, and may be obtained direct from the Publishers, Messrs. Horace Marshall and Son, Temple House, Temple Avenue, London, E.C., at the rate of 2s. per annum, post free. Copies may also be ordered through any newsagent, price 1d. each.

POST OFFICE SAVINGS BANKS, WITH GOVERNMENT SECURITY.

Advantages to Depositors.

Security.—The Post Office Savings Banks are established by Act of Parliament, and every depositor has the *direct security* of the State for the repayment of his deposits.

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Withdrawals can be made with the utmost promptitude by sending notice by post to the London Chief Office on the form provided for the purpose, which is obtainable at any Post Office Savings Bank, and payment can be received at any Post Office Savings Bank in the United Kingdom convenient to the depositor without regard to the office of deposit. During any year ending 31st December a depositor may replace the amount of any one withdrawal previously made in the same year.

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Postage Free.—No charge for postage is made to a depositor, if in the United Kingdom, for any letter passing between him and the Chief Office on Post Office Savings Bank business.

LIST OF LEAFLETS ISSUED BY THE BOARD OF AGRICULTURE.

Number.	Title.
Leaflet No. 1	Mites on Currant and Nut Trees.
,, ,, 2	Vine and Raspberry Weevils.
,, ,, 3	The Turnip Fly or Flea.
,, ,, 4	Caterpillars on Fruit Trees.
,, ,, 5	The Mangel Wurzel Fly.
,, ,, 6	The Field Vole.
,, ,, 7	*Out of Print.*
,, ,, 8	Farmers and Assessments to Local Rates.
,, ,, 9	Ensilage.
,, ,, 10	Wireworms.
,, ,, 11	The Daddy Longlegs or Crane Fly.
,, ,, 12	The Gooseberry Saw-Fly.
,, ,, 13	Acorn Poisoning.
,, ,, 14	The Raspberry Moth.
,, ,, 15	The Apple Blossom Weevil.
,, ,, 16	The Apple Sucker.
,, ,, 17	*Out of Print.*
,, ,, 18	Fertilisers and Feeding Stuffs Act.
,, ,, 19	Pea and Bean Weevil.
,, ,, 20	The Magpie Moth.
,, ,, 21	The Warble Fly.
,, ,, 22	The Diamond Back Moth.
,, ,, 23	Potato Disease.
,, ,, 24	The Ribbon Footed Corn-Fly.
,, ,, 25	The Cockchafer.
,, ,, 26	Farmers and the Income Tax.
,, ,, 27	Remission of Tithe Rentcharge.
,, ,, 28	Anthrax.
,, ,, 29	Swine Fever.
,, ,, 30	The Codlin Moth.
,, ,, 31	The Onion Fly.
,, ,, 32	Foul Brood or Bee Pest.
,, ,, 33	Surface Caterpillars.
,, ,, 34	The Woolly Aphis or American Blight.
,, ,, 35	The Celery Fly.
,, ,, 36	Cultivation of Osiers.
,, ,, 37	Rabies.
,, ,, 38	The Carrot Fly.
,, ,, 39	Assessments to Land Tax.
,, ,, 40	The Kestrel or Windhover.
,, ,, 41	The Red Spider or Spinning Mite.
,, ,, 42	The Short-Eared Owl.
,, ,, 43	Titmice.
,, ,, 44	The Common Lapwing, or Plover.
,, ,, 45	The Starling.
,, ,, 46	The Stem Eelworm.
,, ,, 47	The Asparagus Beetle.
,, ,, 48	The Pea Thrips.
,, ,, 49	The Fruit Tree Beetle.
,, ,, 50	Water Wagtails or "Dishwashers."
,, ,, 51	The White or Barn Owl.
,, ,, 52	Gooseberry Blight.
,, ,, 53	The Pear Midge.
,, ,, 54	The Spotted Flycatcher.
,, ,, 55	The Swallow.
,, ,, 56	The Canker Fungus.
,, ,, 57	External Parasites of Poultry.
,, ,, 58	Internal Parasites of Poultry.
,, ,, 59	Improvement of Land Act.
,, ,, 60	The Wood Leopard Moth.
,, ,, 61	Sheep Scab.
,, ,, 62	The Pear and Cherry Sawfly.
,, ,, 63	Destruction of Charlock.
,, ,, 64	White Root Rot.
,, ,, 65	The Small Ermine Moths.
,, ,, 66	Workmen's Compensation Act, 1900.
,, ,, 67	Favus in Poultry.

Copies of the above leaflets may be obtained free of charge and post free on application to the Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W. Letters of application so addressed need not be stamped.

THE JOURNAL

OF THE

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WINTER WASHING OF FRUIT TREES.

A neglected orchard not only harbours all manner of insect enemies during the winter, which come out in the spring and commence their ravages in that particular orchard, but it forms a nursery or breeding ground from which other orchards are supplied with noxious insects.

It is essential, therefore, that all such orchards should be treated in some way to stop the damage that is caused by the various insect pests they encourage.

For this purpose a caustic or burning wash known as Caustic Alkali Wash is most successful. This mixture serves a double function. It removes, by means of its caustic properties, all vegetal incumbrances, moss and lichen; and at the same time it causes all rough and decaying bark to fall off. A tree so treated soon assumes a more healthy appearance. By the removal of the moss and lichen from the trees, the favourite quarters of many hibernating insects are destroyed. Beneath the vegetal growths and rough bark found on fruit trees we find during the winter the Woolly Aphis, the Apple Blossom Weevil, the Earwig, the Codling Maggot, Thrips, and numerous other small insects. The destruction of their winter quarters places these often serious pests in unfavourable circumstances, and they cease to increase in abnormal numbers. Scale insects, of which two at least are more or less harmful in this country, namely, the Apple Bark Louse or Mussel Scale and the Brown Currant Scale, may also be destroyed by caustic alkali wash.

Not only are moss and lichens and the insects referred to above destroyed or stopped from excessive increase by this wash, but it acts also in another way by attacking the eggs of certain species. The extent of its action on the eggs has not, however, been fully determined. Groups of the eggs of the Apple Suckers (*Psylla mali*) treated with it were all killed, as also were those of the Red Spider on fruit —a species of *Bryobia*—and those of certain aphides. Spraying the wash over eggs recently laid had little effect on them, but, when the embryos were nearly mature, the majority of those of the insects mentioned above were destroyed.

At present, therefore, the wash is mainly recommended for cleaning the trees in an orchard and thus destroying the shelter of various insects during the winter, and for killing certain hibernating pests themselves, as the Codling Maggot, Woolly Aphis, and others. It certainly has no effect in the open on the ova of the Winter Moth, Lackey Moth, and those of certain plant lice.

To prepare caustic alkali wash, first dissolve 1 lb. of commercial caustic soda in water, then 1 lb. of crude potash in water. When both have been dissolved mix the two well together, then add $\frac{3}{4}$ lb. of agricultural treacle, stir well and add sufficient water to make up to ten gallons.

The best time to spray the trees is about the middle of February, as some insect and mite eggs are then more liable to be affected than earlier in the winter, and it is then not too late to harm any developing buds.

The wash has a burning effect on the hands, care must therefore be taken in employing it. Rubber gloves have been used by some people, but these, unless close fitting, allow the wash to run under the rubber, and more harm is done than usual. With ordinary care the sprayers need suffer little inconvenience.

Every old or young orchard where moss and lichen and Woolly Aphis have a firm hold should undergo this treatment, which has a most beneficial effect not only in clearing the trees of moss and rough bark, but indirectly in lessening insect attack.

THE COLORADO BEETLE

(*Doryphora decemlineata Say*).

1. Ova. 2. Full grown Larva. 3. Pupa.
4 and 5. Adults. 6. Seven-spotted Lady Bird (*coccinella 7-punctata*).
7. Pupa of Seven-spotted Lady Bird.

THE COLORADO BEETLE.

Doryphora (Leptinotarsa) decemlineata, Say.

From the regions of the Rocky Mountains the so-called "potato bug," or "spearman," has spread over the greater part of the North American continent. This rapid dispersal during recent years has been mainly due to man's agency in one way and another. Natural means of dispersal, however, also seem to have aided its progress.

Its great vitality under variable conditions in the beetle or adult stage*, and the considerable time the beetles can live, make this potato pest a source of danger to distant lands.

Many insects have been introduced into foreign countries, and have flourished and become serious pests. The Codling Moth (*Carpocapsa pomonella*), the Mussel Scale (*Mytilaspis pomorum*), and other fruit pests have been carried from Europe to America, to Australia, to New Zealand, and have become permanently established, and a serious source of loss to growers.

There is no reason why many North American pests should not flourish just as well here as there. That the Colorado Beetle can do so we have unfortunately had recent evidence. During August its presence was reported to the Board of Agriculture in some allotments in Tilbury Docks, in just such a locality as one would expect to find a primary colony. The beetles had been noticed for some time, and when seen in August were breeding with great energy. Eggs, larvæ in all stages, and adults were found on a large patch of potatoes. Although they were not then very plentiful, they evidently had been, for the allotment holder stated that he had been continually picking them from the potatoes for some time. The inspectors who visited the plots also found large numbers of the beetles and larvæ.

It has appeared in Germany on two occasions. There drastic measures were employed, and the creature stamped

* I have found that the larvæ can also live for some time without food. One taken from Tilbury is at present alive, having been without food for three weeks.

out. Still more drastic measures have been taken in this country, and it is hoped that the visitors have been totally annihilated. The entire infested plot of potatoes at Tilbury was burnt with paraffin, the ground soaked with the same, and then heavily dressed with gas lime, which was deeply ploughed in. All the surrounding herbage was cut and burnt, and also dressed with gas lime. A thorough search of the surrounding potato plots for a radius of $3\frac{1}{2}$ miles did not reveal a single specimen of the beetle.

The fact that this serious potato pest has proved that it can increase rapidly in this country makes it imperative that watch should be kept, and that people should be made acquainted with the appearance of this insect.

Its Life History.

This dreaded potato pest belongs to the genus *Doryphora*, now also known as *Leptinotarsa.* This genus seems to be tropical, Central America being its apparent home, although some species, including the one under discussion, occur in North America.

The adult female beetle is a little under half an inch in length, the male being slightly smaller than the female. In colour, the beetle is yellow, with five longitudinal dark lines on each wing case; the legs are reddish with dark knee spots and feet; the yellow mesothorax has also a few dark spots and a more or less irregular V-shaped mark in the middle; the wings have a peculiar rosy hue, which is particularly noticeable when the beetle is flying in the sun. The adult hibernates during the winter months under any rubbish it can find, but especially buried beneath the surface of the ground. Its general depth in the soil during the winter seems to vary from a few to twenty-four inches. Riley says it has been exhumed from a few inches to several feet, though its habit is not to burrow deeper than ten inches.

The beetles come from their winter quarters when the weather becomes warm in spring. They are capable of flying some considerable distance, especially taking wing readily in

the early part of the year. The warmer the day the more willingly do the insects fly.

The beetles at Tilbury (and those kept in confinement) were to be seen in copulâ at all times, but especially during the bright sunshine. Each female usually deposits from 500 to 700 eggs; as many as 1,000 have been counted according to Riley. Two pregnant females examined from Tilbury contained respectively fifteen and sixty eggs. The ova are evidently produced gradually and deposited over a considerable length of time, the beetles living for some weeks during the summer. The eggs are elongated oval in form, of an orange colour, and are deposited in clusters of from nine to forty; one batch found at Tilbury contained only nine, another thirty-five. They seem to be nearly always placed on the under side of the leaf, and are attached to it by one end. Instead of being separated by short spaces from one another, those under observation were packed tightly together in a bunch. They resemble the ova of some of the *Cocinellidæ* or Lady-birds, but are much larger than those of any of our native species. Riley says they hatch out in less than a week; those under observation were kept ten days before the larvæ came out. The females commence to deposit their eggs when the plants are quite young. The young larvæ observed were of a dull reddish-brown colour, and bear some resemblance to the larvæ of the Lady-birds. As they grow they become paler in colour, varying from dull brickdust red to almost orange in hue, with the head, legs, and posterior part of the first segment black, and with two lateral rows of black tubercule-like spots, the upper row being the largest and composed of seven spots; as the larvæ become mature, the body is somewhat swollen and more or less arched, the apex terminating in a kind of sucker, the upper part of the two apical segments being black. When full grown the larva is rather more than half an inch long when extended. Larval life lasts in America from two to three weeks; judging from those kept under observation taken at Tilbury it lasts quite a month in this country.

The leafage is devoured very ravenously at times by the larvæ, which attach themselves to both upper and under side

and the edges of the leaves. They are also said to feed on the stalk, so that the whole potato haulm is attacked.

When mature, the larvæ fall to the ground and burrow under the soil and there pupate. In America this stage seems to last a week, for Riley, after stating that the larvæ mature in from two to three weeks, says, "the beetle stage is assumed in about a month from the time of hatching."

How many broods might appear in Great Britain, of course, we do not know. As many as three are observed in North America. In Great Britain there is no reason why three broods should not occur, as the larvæ seem to grow very rapidly from observations made on those taken away from Tilbury Docks.

When the weather commences to become cold in the autumn the beetles bury themselves in the earth, where they shelter during the winter, as well as amongst rough herbage and under rubbish of all kinds.

The beetles are extremely hardy and can withstand any amount of rough usage. They have been put into chloroform for two hours, and 40 per cent. solution of formalin for longer, and not affected. In plain water some of the Tilbury specimens were floated for two days and were not in the least injured. The pupæ were soaked in sandy soil and paraffin, and after two days they were found to be alive. It is extremely unlikely therefore that such treatment would act out of doors. Both larva and adult can eject a dark fluid, which is thought by some to be poisonous, but which seems quite innocuous.

Its Food Plants.

There is no doubt that when pressed for food this beetle will take to a great number of plants besides the potato. In its native home it mainly feeds, under natural conditions, on the two wild *Solanums*, *S. rostratum* and *S. cornutum*. The *Solanaceæ*, or nightshade and potato family, form its staple diet, especially the true *Solanums*. The *Solanums* upon which the larvæ have been found in America, are the following: The common horse-nettle (*S. Carolinense*), found in Missouri and east of the Mississippi; *S. robustum*, *S. discolor*, *S. Sieglingii*, and *S. Warscewiczii*.

The closely related tomato (*Lycopersicum*), the thorn apple (*Datura*), the henbane (*Hyoscyamus*), the tobacco plant (*Nicotina*), the apple of Peru (*Nicandra*), the ground cherry (*Physalis*), belladonna, and petunia have also been recorded as harbouring this pest, but upon scarcely any can it flourish except the tomato.

Several specimens taken at Tilbury fed and matured on the tomato.

Various poppies, especially the Mexican or prickly poppy (*Argemone Mexicana*), also serve as food plants in America.

From the States it has also been recorded feeding on the following: The pigweed (*Amarantus retroflexus*, L.), the hedge mustard (*Sisymbrium officinale*), oats, smart-weed (*Polygonum hydrosipei*, L.), the red currant, various thistles, goosefoot (*Chenopodium hybridum*, L.), thorough-wort (*Eupatorium perfoliatum*, L.), the European black henbane (*Hyoscyamus niger*, L.), and the mullein (*Verbascum*).

Grasses and other weeds have been known to harbour the larvæ. At Tilbury they were observed feeding on woody nightshade, cabbage, and thistles, whilst the eggs were found in one case on the sowthistle (*Sonchus*). It thus seems that although members of the genus *Solanum* are its chief diet, especially the cultivated potato (where its original food plant does not occur), both larvæ and adults can feed off a variety of other plants, preferably devouring the young leaves.

How the Pest Travels.

The Colorado Beetle can only spread under natural conditions in the adult or beetle stage. The beetle, with its ample rose-coloured wings, is capable of considerable powers of flight, but its enormously rapid advance in numbers in America, sometimes at the rate of 100 miles a year, cannot be attributed to its own locomotive powers, save under exceptional cases. That the beetles can keep alive a great time in water is a factor which enables them to spread very rapidly; they may get drifted down stream a great many miles before they would be destroyed; similarly, they may fall into and get drifted across large lakes. This potato pest may be found in

numbers along the St. Joseph shore of Lake Michigan, where they seem to have come by flying and swimming from the opposite shore.

Wind and water no doubt materially aid the advance of this pest on the American continent, and no doubt would do so here if the beetle became once permanently established. Its spread over the greater part of America is, however, not to be attributed to its power of flight, or to water, or wind, but to artificial transportation.

The beetles are carried by trains, boats, in barrels, amongst the potato haulm, and even settled casually upon the woodwork of a train or boat. Eggs may have now and then been carried on living plants, and even pupæ in earth, but it is the adult beetle, with its great powers of vitality, that has spread so rapidly through the agency of man.

How can the beetle have made its journey to Great Britain? We know that the adults can live for some time, and that, too, without food. Nothing is easier for these beetles, which swarm in America, and which have been seen flying about in the streets of New York, to settle upon some outward-bound vessel, and so be transferred to our shores. If that insect happened to be a pregnant female, and met with favourable weather on reaching the Thames, she would soon fly to the numerous neighbouring potato fields, lay eggs, and so set up a colony. The strange thing is that it has not taken place before. In no other way is it likely to have come over. Potato haulm is not allowed to be imported from America, under the Customs Order of 1877, so that there is no danger of its introduction in that way, which would probably be a fruitful source of infection.

Pupæ might be imported in particles of earth attached to potatoes, but American potatoes generally come over in a particularly clean condition, so that the chances are strongly against invasion in that way.

The Possibilities of the Beetle Living in Great Britain.

Although we have no members of the genus *Doryphora* living in Europe, there seems no reason why this particular species should not live and become perpetually established. The climatic conditions of this country are by no means

inimical to the Colorado Beetle. The insect, says Riley, is northern rather than southern in its native habitat. The larvæ, according to Riley, cannot withstand any great variation in temperature; they do not thrive, he says, where the thermometer has a range of 100 degrees Fahrenheit. Moreover, the larvæ cannot stand a hot burning sun; they like a humid atmosphere. Its northern spread is probably unlimited, until the arctic region is reached, for prolonged frosts do not affect the hibernating beetles; the greater length of winter and the greater cold would only reduce the number of broods.

Yet we must not forget that the genus to which this beetle belongs is southern rather than northern, the Colorado Beetle itself occurring as far south as Mexico. It breeds and flourishes in numbers in Kansas and in places where the temperature has a still greater range, so that too much reliance cannot be placed on Riley's statement referred to above.

Its Natural Enemies.

A great number of natural enemies tend to check the beetle in America. Amongst these are birds which feed upon both larvæ and adults, especially the Rose-breasted Grosbeak (*Guiraca ludoviciana*).

Both ducks and chickens, but especially the former, devour the larvæ.

The Toad in America (*Bufo Americana*) gorges itself with the grubs, and doubtless our British species would do the same.

Very numerous are the insect enemies recorded by Riley, especially amongst the Beetles or Coleoptera, and the Bugs, or Hemiptera-heteroptera. Strange to say, no members of the Hymenoptera, the order that contains so many parasites, are actually parasitic on *Doryphora*; a single species of Wasp (*Polistes rubiginosus. S. Feug.*), however, occasionally provisions its nest with the larvæ.

Whilst examining the allotments at Tilbury, the large Seven-spotted Ladybird (*Coccinella septem-punctata*) was noticed in considerable numbers both in adult and larval stages. The larvæ were seen in one instance devouring the

eggs of the Colorado Beetle, and when placed in a box with some ate them ravenously. Thus in the short space of time that this potato pest has, apparently, been in this country it has found one natural enemy which, on account of its ravenous nature, could not but help materially in checking its increase.

The pupa of the Ladybird is orange with black marks and spots, and resembles very closely the small grub of the Colorado Beetle. A small Hemipteron, a green *Nemocoris* (?) was also seen wandering about amongst the larvæ, and may have been feeding off them, sucking out the body juices in the same way several species do in America.

Closely-related Beetles.

There are three closely-related species of *Doryphora*, namely, *D. undecemlineata* Stål, *D. juncta* Germ, and *D. melanothorax* Stål. The former has black legs, but otherwise resembles the Colorado Beetle.

D. melanothorax has an entirely dark thorax, not yellow, with black spots and central mark.

D. juncta, or the Bogus Colorado Beetle, has two of the black lines on the wing cases very closely united, almost forming one broad single line. This latter has often been confounded with the true Colorado Beetle. It occurs in the south and south-west of North America, and feeds on the horse nettle (*Solanum Carolinense*), but never touches the potato.

A fourth species is said to exist, *D. multitaeniata* Stal, but I can detect no difference between it and *D. undecem lineata.*

The larva of *D. juncta* differs from that of *D. decemlineata* when newly hatched in being much paler, more the colour of the adult *decemlineata*; when full grown the larva of *juncta* has a pale head, that of *decemlineata* a black head.

The eggs also differ; those of *juncta* are whitish, not orange as in the Colorado Beetle.

Should by any chance this pest become established in this country, growers will have to employ the remedy that has met with such marked success in America, namely, spraying with *Paris Green.* Probably *Arsenate of Lead* would be found even a more successful insecticide, and, as in orchards, one less liable to harm the leafage. FRED. V. THEOBALD.

SHEEP-FEEDING EXPERIMENTS IN SCOTLAND.

During recent years a number of feeding experiments on a fairly large scale have been carried out in Scotland, under the auspices of the Highland and Agricultural Society, and reports of them with all the details of importance have been published in the *Transactions*, vols. ix., x., xii., xiii. Some of these have been made with cattle and others with sheep, and it is to some of the results obtained in the sheep-feeding experiments that this article refers. The main object in view has been to determine which of the by-fodders in common use can be most efficiently and economically given to hoggets consuming turnips in the open field during the winter months so as to be sold as fat in spring. The number of such feeding stuffs in common use in Britain is much fewer than on the continent, and it might be considerably increased with advantage; but, as there is some risk in introducing new fodders, farmers are naturally slow to change their methods. The subjoined list gives the names and average composition of the few feeding stuffs used in the Society's experiments and their approximate average prices:—

Feeding Stuff.	Albumen.	Oil.	Carbo-hydrates.	Average Price per ton.
				£ s. d.
Linseed cake - - - -	28	9	35	8 0 0
Cottoncake, decorticated -	45	10	20	7 0 0
Cottoncake, undecorticated -	24	7	25	6 0 0
Maize (Indian corn) - -	10	5	65	4 10 0
Oats - - - - - -	11	6	50	6 12 0
Barley - - - - - -	11	2	65	6 4 0
Dried Grains - - -	20	8	45	5 0 0
Barley Bran - - - -	15	5	50	5 0 0

These were given both singly and as mixtures along with as much turnips as the sheep would eat, and sometimes with hay in addition.

The sheep were usually folded on the turnip break from which the turnips had been lifted, and the turnips for all the lots were weighed, sliced, and fed from feeding boxes, and any turnip matter left uneaten in the boxes was daily removed and its weight deducted.

The feeding stuffs were usually given at a uniform rate, from half a pound to a pound per head per day, but sometimes at a uniform cost per head per day, in which case the quantity of the different stuffs varied considerably, but the quantity given was always totally consumed.

In the limited space at my disposal I shall refer to some of the chief facts elicited and lessons taught by these experiments.

The number and kind of sheep required for experiment.

At first ten sheep were used for each lot, but that number was found to be quite inadequate, and no reliance could be placed on the results obtained owing to the remarkable manner in which individual sheep differed in their feeding propensities and progress. The number was therefore raised to twenty per lot, and it has been found that with that number reliable results may be obtained; the two or three bad doers in a lot being balanced by two or three unusually good ones. The sheep used were always of the same age and breed, and from the same stock, brought up on the same farm, and having received similar treatment in every way. Despite these uniform conditions, the individuals exhibited great variety in their physique and in their feeding progress.

They were carefully drawn into lots of almost exactly equal aggregate weight, and a reserve of about a score was kept to make good any blanks that might occur from various causes so as to simplify the feeding operations, but any added individuals of that kind were not included in the scope of the experiment.

As an instance of the differences observed in the individuals of one lot, it was found in 1897 that the lot fed on a mixture of oats and barley made an average increase of 10 lb. per head in twelve weeks, but four individuals

increased 20 lb. per head or more, four remained almost stationary, and two actually lost weight. That was an extreme case. The mixture was the poorest feeding stuff of all, and it was found that as the kind of feeding stuff used was of a better quality the variations in individual progress became less, The greatest variations occurred where no extra feeding stuff was given, and the chief merit of a good feeding stuff was found to be its power of improving the appetite of the poorest feeders and bringing the entire lot into fairly uniform condition. But even in the lot most poorly fed there will sometimes be found a great feeder. In the experiment cited above we may compare the lot fed on a mixture of oats and barley with the neighbouring lot fed on a mixture of decorticated cotton cake and dried grains—equal weights per head per day. The latter increased on an average about 22 lb. per head in the twelve weeks and only three individuals made less than 16 lb increase.

Feeding progress chiefly dependent on the feeding quality of the turnips.

The feeding quality of turnips depends on a variety of conditions—in the first place, the fertility of the land. There are certain kinds of land that are known to produce turnips of good feeding quality. Akin to that there is the kind and quality of manure used, and there is also the kind of seed, and climatic and weather conditions. The quality of first importance in a turnip used for sheep-feeding is a high percentage of solid matter. An average turnip will contain about 10 per cent. of solids, and of course 90 per cent. of water. It may at first sight seem a small matter that the amount of water may be increased to 92 per cent. or reduced to 88 per cent., but it means that the former contains 8 per cent. and the latter 12 per cent. of solid food, *i.e.*, half as much again as the former. The feeding value of the two will vary correspondingly, though not, perhaps, in direct proportion.

Sheep eating turnips with 8 per cent. solids would require to eat half as much again as those eating turnips with 12 per cent. solids so as to be able to consume the same amount of turnip food; but this is impossible, even if the two kinds of

turnip were equally relished. So far, however, is this from being the case, that it has been found that sheep prefer turnips that are richer in solids, and make greater progress on them than they do on the more watery kind.

The following results obtained in these experiments will serve to illustrate this point if the turnips are arranged according to their content of solids:—

	Solids. Per cent.	Albuminoids in Solids. Per cent.	Live-weight increase per head per week. lbs.
1. 1898 Whitelaw - - -	10·98	11·0	2·4
2. 1901 Airleywright - -	10·00	13·0	2·6
3 1900 Challoch - - -	9·56	9·0	2·1
4. 1898 Ferney Castle - -	8·89	8·5	1·8

The more solids the turnips contained the better was the progress made in a general way; but it will be seen that there is something more than mere quantity of solids to consider—there is quality as well, and that will explain why No. 2, consuming turnips containing 13 per cent. of albuminoids in their solid matter, progressed better than No. 1 with turnips containing only 11 per cent. of albuminoids. Objection may easily be taken to such a comparison as the above, seeing that the experiments were carried out in different years and on different farms, and otherwise in circumstances not exactly comparable; but the same thing had been previously noticed in the Society's cattle-feeding experiments, where the conditions were entirely favourable for such comparisons.

The effect of by-fodders upon the consumption of turnips.

It is natural to expect that when sheep are getting some by-fodder along with their turnip dietary, they will consume less turnips than they would do if they were fed on turnips alone. That does not always happen. At Challoch, in 1900, the lot that got nothing but turnips did not eat so much turnips as most of the other lots that had from half a pound to a pound per head of cake, grains, or other dry by-fodders in addition. The one probable explanation seemed to be that the turnips were not of very good feeding quality, and, there-

fore, not very appetising, and that there was also a prevalence of cold, stormy weather. The sheep getting by-fodder would be more vigorous, and better able to stand up to their feeding boxes while the cold winds blew. Whatever the reason, the fact is important that the giving of a by-fodder does not necessarily diminish the consumption of turnips. Another important fact brought out by these experiments is that some by-fodders affect the quantity of turnips consumed very differently from others. Thus, it was uniformly found that sheep getting maize as a by-fodder consumed less turnips than those getting any other of the by-fodders. On the other hand, the giving of dried grains caused a greatly increased consumption of turnips, and the undecorticated cotton cake was also very favourable to turnip consumption.

Dried grains as a by-fodder.

Perhaps the most important fact brought out by the Society's experiments is the superiority of good dried grains to all the other by-fodders used in maturing sheep that are consuming turnips. It has proved to be not only the best, but also the cheapest of the by-fodders. But there are different qualities of dried grains according to their source and to their manufacture. Dried grains is the residue derived from barley which has been malted and mashed and had almost all its starch converted into sugar and extracted so as to be further converted into alcohol in the manufacture of beer or malt whisky. Dried grains, therefore, contains less carbohydrates than barley, but twice as much albuminoids and oil, and is, therefore, weight for weight, much more nutritious than the barley from which it is derived. It contains only about 10 per cent. of water, and is therefore four times as nutritious as ordinary wet draff. Sheep are remarkably fond of it, and consume with avidity 10 lbs. or more per head per day.

Dried grains derived from distilleries where other kinds of grain than barley are used for making alcohol may be of inferior quality, and, on the other hand, some manufacturers mix dried grains in such a way as greatly to improve their

feeding quality. The material should therefore be bought under a guarantee of analysis, and the same may be said of all other feeding stuffs. The only case in which dried grains did not produce better results than any other feeding stuff was when it was found on analysis to be of inferior quality. While it has been proved to be peculiarly well adapted for sheep-feeding, it has also produced excellent results in cattle-feeding experiments.

Oilcakes.

Linseed cake is the most popular by-fodder, equalling in its consumption all the others put together. On account of the large amount of mucilage it contains, it has an emollient and laxative action upon the stomach and intestines, but it has three main defects—it varies extraordinarily in quality, it is relatively dear, and frequently adulterated. It has a very marked fattening tendency, and is chiefly valuable during the latter part of the feeding period when the stock have attained their full size and need only to be fattened. They acquire a softness of skin, fineness of wool, and what is known as bloom better with this by-fodder than with the others. Only on one occasion did it produce disappointing results. At Challoch some linseed cake was used with an unusually high percentage of albuminoids—nearly 35 per cent.—and though it was given to the sheep at the rate of only half a pound per head per day it was nearly two months before they got used to it and during that time they made little progress. Thereafter they progressed rapidly, but never overtook the lot fed on dried grains at considerably less cost. The fattening tendency of linseed cake was found to have a beneficial effect during cold and stormy weather, permitting the sheep to maintain their ground, while those fed otherwise fell back somewhat in condition.

Decorticated Cotton Cake.—This is a very concentrated cake, too much so to be given with safety except in very small quantities. It is most suitable for mixing with weaker stuffs, but even then there is the danger that some sheep will pick out of the mixture an undue amount of the cake and be

injured thereby, sometimes even fatally. Owing to this its use was abandoned in later experiments.

Undecorticated Cotton Cake.—This differs from the above in that the husk of the cotton seed has not been altogether removed. It has proved a useful by-fodder, especially suitable during the first half of the feeding period, when the sheep are still growing. It possesses astringent properties and therefore is in marked contrast to linseed cake, whose too fattening or too laxative action it may be used to modify or correct. It is well suited for forming part of a mixture, and is both a cheap and efficient by-fodder for sheep.

Cereals.

Maize or Indian Corn.—Sheep possess an extraordinary power of grinding maize with their teeth even when given whole, but it was considered that the time and effort so spent had better be saved to them, and only crushed maize was used in these experiments. As already observed, sheep eating crushed maize consume less turnips than others, and it seemed probable that the difficulty of grinding the maize and the time absorbed in the process might be largely accountable for that peculiarity. If that were all, the difficulty might be overcome by giving the maize in the form of well ground meal. In doing so, however, there is the danger of spoiling the by-fodder by making it so powdery as to irritate the nostrils of the sheep and cause them to refuse it altogether. Sheep are peculiarly sensitive in that respect. This was very forcibly exhibited in their entire refusal to eat *Barley Bran* which, when given to cattle in previous experiments along with pulped turnips, was found to be the most effective and economical of by-fodders. Given to sheep in the same manner it might perhaps be equally serviceable, but that cannot be done conveniently in the open field. Sheep take maize readily, and do very well on it at first for a few weeks, often excelling those fed on cake, but the rapid progress does not continue, and they are eventually overtaken by the cake-fed lots. Maize is a very farinaceous diet, poor in albumen, and requires to be fortified with some more albuminous by-fodder so as to suit young growing sheep.

It is important also that feeders should be made aware of the fact that no cereal fluctuates so widely in its composition as maize—the albuminoids vary from $5\frac{1}{2}$ to $15\frac{1}{2}$ per cent., and the oil, which is a very important constituent of that cereal, ranges from $1\frac{1}{2}$ to 9 per cent., and it should always be bought under a guarantee of analysis.

Oats.—This has been used as a by-fodder for sheep from old times, and it was the chief one used before the importation of other concentrated by-fodders. It resembles maize in composition very closely, but unless in the case of light or unsaleable corn it cannot be used as a substitute for maize with economy. It also fluctuates greatly in composition, and has proved itself to be a very profitless by-fodder, and productive of poor results, even when of first class quality. At no stage of the feeding process does it possess any distinctive advantage, and the oat-fed sheep always killed badly, and one notable peculiarity of their carcases was the abundance of loose tallow. The maize-fed lots also shared that peculiarity, but in a minor degree. Oats is so valuable a feeding stuff for horses or for other animals that are being fed for strength that it commands a price far in excess of its value as a fat producer, and therefore it is profitable to sell even inferior oats, and use the price for the purchase of other feeding stuffs when fattening is the object in view.

Barley.—This also is a very farinaceous by-fodder, having the defects of both maize and oats without their advantages so far, at least, as sheep feeding is concerned.

Mixtures.

It is the practice of most feeders to use mixtures of by-fodders, and the few mixtures that were used in these experiments give support to the view that there is both safety and economy in their use. There is much to be learned on this subject, and it offers a wide field for investigation of a most useful and profitable kind.

The few experiments as yet carried out by the Society in this direction would indicate the following as a rational kind of practice so far as the limited number of feeding stuffs operated with are concerned. For the first month sheep that

are fattening and consuming turnips in the open field might receive with advantage equal parts of decorticated cotton cake and maize; during the second month dried grains should gradually take the place of maize in the mixture, and the quantity of it be increased until the mixture becomes two parts of dried grains for one part of decorticated cotton cake; during the third period the cotton cake should gradually be replaced by linseed cake. By such a graduated mixture there is reason to expect that at first the sheep would grow in size and put on flesh, thereafter they would increase in flesh and fat, and towards the end they would fatten and finish rapidly, and acquire that touch and bloom that are so much appreciated.

Should it be the desire of the feeder to fatten a lot of sheep as quickly as possible it would seem, so far as these experiments have gone, that there is no by-fodder so useful as linseed cake alone.

Should sheep get hay along with turnips?

There seems to be a complete divergence of opinion on this question among Scottish farmers. In some parts of the country no hay is ever given to sheep folded on turnips, while in others a certain amount of hay is considered indispensable. A part of last year's sheep-feeding experiment was arranged so as to give an answer to this question. One lot was fed on turnips and linseed cake, and another on turnips and linseed cake with as much hay in addition as the sheep cared to eat. The results were curious and instructive. Both lots ate exactly the same amount of turnip, so that the hay consumed did not diminish their appetite for turnips, though the hay-fed lot ate half-a-pound of hay per head per day. When this had gone on for eleven weeks it was found that the lot that got no hay had increased 2½ lbs. per head more than those that had received hay in addition. Moreover, half of them were fat and finished, while none of the hay-fed lot were. About ten days later they ought to have been sold as fat, but they were kept on for another fortnight. At that time, half only of the hay-fed lot were fat, and the remainder required a week's feeding

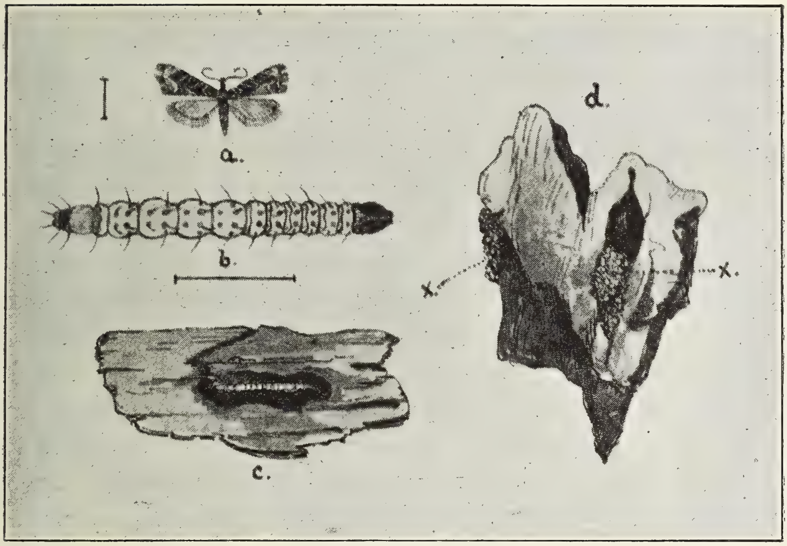
extra to fit them for the market. At the end of the experiment, when the carcases were weighed, it was found that the hay-fed lot were nearly 2 lbs. per head heavier. That gain was got at the cost of 50 lbs. of hay per head and about three weeks longer keep. It was reckoned that the hay-feeding had resulted in a loss of about 3s. per head. Had the sheep not been getting cake it is probable that the hay-feeding would have been found profitable, but there was no lot fed on turnips alone to prove that.

One or two other points may be noticed. It has been shown that a preponderance of farinaceous matter in the fodder increases the proportion of fat in the carcase, while a preponderance of nitrogenous (albuminoid) matter increases the production of wool. It has also been shown that what is known as the *albuminoid* or *nutrient ratio* is no satisfactory guide to feeding when applied to the total fodder of sheep consuming a dietary consisting of turnips and by-fodders either with or without hay. As regards the quality of the mutton produced, the opinion of the butchers employed was that dried grains produced the best mutton, and that the mutton of the lot in whose dietary maize took a part was just about as good.

A. P. AITKEN.

THE PLUM-TREE BORING TORTRIX.

(*Sesamia Wæberana*, Autor).



(*a*) The adult ; (*b*) the larva : lines showing natural size. (*c*) The larva in chamber beneath bark. (*d*) Piece of bark showing masses "frass" (x) passed out by the larvæ.

An interesting attack on cherry trees has been reported from Kent. For two or three years a couple of cherry trees, planted about nine years ago, did not make the progress they should have done, and upon close examination little brown deposits were found at the bottom of the trees in the bark near the earth, and, on cutting the bark, larvæ were discovered. Numerous other trees were seen with deposits near the ground, and it was feared the pest might be spreading. On examination the larvæ proved to be those of one of the *Stigmonotidæ*, belonging to the genus *Semasia* and the species *Wæberana*.

The insect has not often been recorded as doing damage in this country, but it is very common, and widely distributed

over Great Britain. Probably it is often overlooked, the damage being put down to other causes than insect injury. Kollar, however refers to it, and there have been references to it in some of the gardening journals. It is popularly known as the "plum-tree boring tortrix," or simply the "plum-tree tortrix," an unfortunate name, as it attacks numerous other trees, especially the apple and cherry, etc. Stainton also records it from the laurel; Kollar, from the peach, nectarine, and apricot. It has been found in abundance on the peach at Kingston-on-Thames, where several trees decayed away owing to the presence of this pest.

The larvæ often cause considerable harm to apple, plum, and cherry trees, by burrowing under the bark. The caterpillars feed on the inner bark, and cause exudation of sap. Patches of gum soon appear, and swellings and rugosities form, decay usually sets in, and in many cases the tree dies under the attack, especially when young trees are invaded.

The presence of the larvæ under the bark can always be detected by the little heaps of reddish-brown "frass" or excretions of the larvæ. The burrows formed under the bark are very irregular in form, sometimes there are quite large chambers an inch in length. The attack generally seems to originate at the base of the tree, where the little heaps of "frass" stick on to the bark and cover the small round hole, the entrance to the larval tunnel beneath the outer bark.

Life History.—The adult is a small moth with dull orange-brown forewings with dark brown or black markings, short yellow streaks on the costa, a distinct ocellus or eye-like spot at each wing tip, and a pearly border enclosing three black lines; the under wings are brown. In length the wing-expanse varies from half to nearly two-thirds of an inch. When resting on the bark of the tree it sits with its wings folded in a slanting position. There are two broods in the year, one in May and the second in September. The larvæ are dull pinkish-white to pale dirty-brown, with a distinctly-lobed brown head, and with two large median and small lateral dusky tubercles on the first six segments, a simple hair arising from each; on the four following segments are two additional small dorsal spots behind the two large ones,

and the apical segments are somewhat darker than the rest. When mature the larvæ under observation measured over half an inch. All were mature by the first week in May, some having commenced to pupate on April 30th. The pupæ are brown, and are enclosed in a yellowish cocoon under the bark. The moths commenced to hatch out on May 21st, the pupal stage lasting nearly three weeks.

This first brood soon commence to lay their eggs on the bark of the trees. In six days a small larva appears and at once commences to burrow to the inner bark, in which it tunnels and undergoes its development, pupating in August and the early part of September. The second brood of moths arises from these pupæ, and lay their eggs again on the outer bark. The winter is passed in the larval stage. The pupa previous to the emergence of the moth works it way to the exit hole beneath the "frass," and forces its way partly out of the hole, so that the moth can easily escape from the ruptured pupal skin. The creatures are very persistent in the attacks on individual trees.

Treatment.—Little can be done to prevent this pest, but probably smearing cart-grease round the trunk, or, better still, a mixture of grease and paraffin, from the ground some way upwards during the middle of May would prevent egg-laying, another application being made in September when the second brood are egg-laying.

When once under the bark little can be done. The openings of the tunnels may be found on clearing away the "frass," and a wire inserted up the cavity, or a knife forced in, so as to kill the larvæ during the winter. Where only a few trees are attacked this is perhaps the best mode of treatment; on a large scale, smearing the diseased spots with grease and strong paraffin and rubbing it well in after the "frass" has been brushed off might be tried with possible benefit.

AGRICULTURAL RETURNS OF 1901.

The Preliminary Statement giving the totals of the Agricultural Returns of Great Britain for the current year was issued by the Board of Agriculture on the 27th of

Crops in Great Britain.	1901.	1900.	Increase.	Decrease.
	Acres.	*Acres.*	*Acres.*	*Acres.*
Total acreage under all Crops and Grass (a)	32,417,445	32,437,386	—	19,941
Wheat	1,700,965	1,845,042	—	144,077
Barley	1,972,448	1,990,265	—	17,817
Oats	2,996,902	3,026,088	—	29,186
Rye	56,650	53,564	3,086	—
Beans	251,613	263,240	—	11,627
Peas	155,130	157,209	—	2,079
Potatoes	577,260	561,361	15,899	—
Turnips and Swedes	1,664,525	1,688,606	—	24,081
Mangold	398,805	414,416	—	15,611
Cabbage	60,341	64,985	—	4,644
Kohl-Rabi	17,004	20,732	—	3,728
Rape	102,980	109,966	—	6,986
Vetches or Tares	157,546	177,951	—	20,405
Lucerne	43,546	36,702	6,844	—
Other Green Crops	107,191	105,403	1,788	—
Clover and Rotation Grasses — For Hay	2,356,415	2,201,781	154,634	—
Clover and Rotation Grasses — Not for Hay	2,499,972	2,557,377	—	57,405
Total	4,856,387	4,759,158	97,229	—
Permanent Grass (a) — For Hay	4,350,459	4,373,099	—	22,640
Permanent Grass (a) — Not for Hay	12,476,790	12,355,936	120,854	—
Total	16,827,249	16,729,035	98,214	—
Flax	672	467	205	—
Hops	51,127	51,308	—	181
Small Fruit	74,999	73,780	1,219	—
Bare Fallow	344,105	308,108	35,997	—

(a) Not including Mountain and Heath Land.

August. For the first time this summary supplies particulars of the area under each crop ultimately enumerated in the final tables, instead of, as in former years at this date, the areas only of wheat, barley, oats, potatoes, clover, grass and hops.

The foregoing table compares for Great Britain as a whole the distribution of the acreage returned as under crops and grass in the present year, with the figures for 1900.

The total acreage under all kinds of crops and grass has again slightly declined by nearly 20,000 acres, which is equivalent to a diminution of one-tenth of one per cent. during the year.

A reduction of 144,000 acres (7·8 per cent.) brings the total area under wheat once again practically to the level of 1896. Reductions much less important in extent are shown in the other cereals, except rye. Potatoes have increased by 2·8 per cent., and the group of unenumerated green crops by 1·7 per cent., while the further extension of the acreage under lucerne by 18·6 per cent. is noteworthy. The area under turnips, mangold, vetches, and certain minor green crops has, however, further declined. Gains, on the other hand, of nearly 100,000 acres in each case, are shown in the surface returned as under rotation and permanent grass respectively. The area of clover and rotation grasses reserved for hay was greater by 7 per cent., but permanent grass kept for hay showed a fractional reduction.

The preliminary statistics of the number of live stock in Great Britain include, for the first time, horses, and these are returned as slightly more numerous than in 1900. An increase in the number of cattle of two years and above has not sufficed to avert a decline in the total number of cattle returned, which is due to the reduced numbers of cows and of young stock in the present season. Sheep have, in the aggregate, decreased by less than one per cent., but the breeding flock of ewes appears to have been diminished by 1·8 per cent. The numbers of swine have again declined, the total being less by 8·5 per cent. than in 1900. The following table gives the number of live stock in Great Britain :—

Animals in Great Britain.	1901.	1900.	Increase.	Decrease.
	No.	*No.*	*No.*	*No.*
Horses used solely for Agriculture (*a*) - - -	1,089,418	1,078,371	11,047	—
Unbroken Horses :—				
One year and above - -	294,162	295,477	—	1,315
Under one year - -	127,851	126,295	1,556	—
Total of Horses -	1,511,431	1,500,143	11,288	—
Cows and Heifers in Milk or in Calf - - - -	2,602,294	2,620,901	—	18,607
Other Cattle :—				
Two years and above -	1,427,983	1,372,532	55,451	—
One year and under two -	1,407,653	1,460,808	—	53,155
Under one year - -	1,325,964	1,350,929	—	24,965
Total of Cattle- -	6,763,894	6,805,170	—	41,276
Ewes kept for Breeding -	10,161,830	10,350,326	—	188,496
Other Sheep :—				
One year and above - -	5,940,896	5,963,869	—	22,973
Under one year - -	10,274,474	10,278,031	—	3,557
Total of Sheep -	26,377,200	26,592,226	—	215,026
Sows kept for Breeding -	319,724	332,521	—	12,797
Other Pigs - - - -	1,860,201	2,049,411	—	189,210
Total of Pigs - -	2,179,925	2,381,932	—	202,007

(*a*) Including Mares kept for Breeding.

The Department of Agriculture and Technical Instruction for Ireland have also issued preliminary statements showing the area under the various Irish Crops in 1901. A comparison with the crop areas in 1900 furnishes the results shown in the subjoined table. It will be noticed that all the different kinds of corn in Ireland show a falling off, the most serious reduction being one of 20 per cent. in the small area under wheat. The areas under oats and barley are also less in extent. Irish green crops, as a whole, also show a decline of over 1·7 per cent. This is entirely attributable to the reduction of nearly 19,000 acres, or

about 3 per cent., in the area under potatoes; a decrease in turnips being counterbalanced by an increase under mangold and beet. Flax and all kinds of grass and clover show an increase in Ireland.

CROPS IN IRELAND.	1901.	1900.	Increase.	Decrease.
	Acres.	*Acres.*	*Acres.*	*Acres.*
Total Area under Crops -	4,630,480	4,658,732	—	28,252
Wheat - - - - -	42,920	53,821	—	10,901
Oats - - - - - -	1,0[illegible]9,403	1,105,050	—	5,647
Barley - - - - -	161,499	173,996	—	12,497
Bere and Rye - - -	11,154	11,584	—	430
Beans and Peas - - -	2,614	2,738	—	124
Potatoes - - - - -	635,340	654,079	—	18,739
Turnips - - - - -	289,849	297,859	—	8,010
Mangold and Beetroot -	77,437	68,803	8,634	—
Cabbage - - - - -	43,486	42,913	573	—
Vetches and Rape - -	7,807	7,543	264	—
Carrots, Parsnips, and other Green Crops - - -	25,510	27,180	—	1,670
Flax - - - - - -	55,471	47,451	8,020	—
Hay:—				
From Clover, Sainfoin, and Rotation Grasses - -	617,211	607,380	9,831	—
From Grass not broken up in Rotation - - -	1,560,779	1,558,335	2,444	—
Grass - - - - - -	10,578,409	10,563,372	15,037	—

The changes in the number of Irish live stock are given in the following table, showing, as in the case of Great Britain, the horses used for agricultural purposes and unbroken horses only.

The Irish figures for cattle differ from those for Great Britain by showing increases in all the classes enumerated, although the total gain is under 1·5 per cent. The decline in sheep in Ireland is fractional, and that in pigs is relatively less than in Great Britain.

It is to be noted that the Agricultural Returns for Ireland distinguish for the first time both ewes and sows kept for breeding.

The Irish live stock statistics also contain estimates of the number of goats, 312,386 in 1901, and of poultry 18,807,766 head.

ANIMALS IN IRELAND.	1901.	1900.	Increase.	Decrease.
	No.	*No.*	*No.*	*No.*
Horses used solely for Agriculture - - - -	354,700	369,685	—	14,985
Unbroken Horses :—				
One year and above - -	73,691	64,448	9,243	—
Under one year - -	62,989	57,023	5,966	—
Total of Horses - -	491,380	491,156	224	—
Milch cows, including heifers in calf - - - - -	1,481,443	1,458,074	23,369	—
Other cattle :—				
Two years and upwards -	1,041,378	1,031,009	10,369	—
One year and under two -	1,046,188	1,033,941	12,247	—
Under one year - -	1,103,026	1,085,526	17,500	—
Total of Cattle - -	4,672,035	4,608,550	63,485	—
Ewes, kept for breeding -	1,691,274 }	2,586,046	314	—
Other sheep :—				
One year and upwards -	895,086 }			
Under one year - -	1,792,285	1,800,830	—	8,545
Total of Sheep - -	4,378,645	4,386,876	—	8,231
Sows kept for breeding -	130,580 }	1,268,521	—	49,475
Other pigs - - - - -	1,088,466 }			
Total of Pigs - - -	1,219,046	1,268,521	—	49,475

So far as the Irish tables permit, a preliminary statement of the areas under certain crops in the United Kingdom (*excluding* the Channel Islands and the Isle of Man, for which the data are not yet available) may be made as follows :—

CROPS IN GREAT BRITAIN AND IRELAND.	1901.	1900.	Increase.	Decrease.
	Acres.	*Acres.*	*Acres.*	*Acres.*
Wheat - - - - -	1,743,885	1,898,863	—	154,978
Oats - - - - -	4,096,305	4,131,138	—	34,833
Barley - - - - -	2,133,947	2,164,261	—	30,314
Beans and Peas - -	409,357	423,187	—	13,830
Potatoes - - - - -	1,212,600	1,215,440	—	2,840
Turnips - - - - -	1,954,374	1,986,465	—	32,091
Mangold and Beetroot -	476,242	483,219	—	6,977

The total numbers of horses, cattle, sheep, and pigs in the United Kingdom (*excluding* the Isle of Man and Channel Islands) are as follows :—

ANIMALS IN GREAT BRITAIN AND IRELAND.	1901.	1900.	Increase.	Decrease.
	No.	*No.*	*No.*	*No.*
Horses used solely for Agriculture - - -	1,444,118	1,448,056	—	3,938
Unbroken Horses :—				
One year and above -	367,853	359,925	7,928	—
Under one year - -	190,840	183,318	7,522	—
Total of Horses -	2,002,811	1,991,299	11,512	—
Milch cows, including heifers in calf - -	4,083,737	4,078,975	4,762	—
Other Cattle :—				
Two years and upwards	2,469,361	2,403,541	65,820	—
One year and under two	2,453,841	2,494,749	—	40,908
Under one year - -	2,428,990	2,436,455	—	7,465
Total of Cattle -	11,435,929	11,413,720	22,209	—
Ewes kept for breeding -	11,853,104	18,900,241	—	211,155
Other sheep :—				
One year and upwards -	6,835,982			
Under one year - -	12,066,759	12,078,861	—	12,102
Total of Sheep -	30,755,845	30,979,102	—	223,257
Sows kept for breeding -	450,304	3,650,453	—	251,482
Other pigs - - -	2,948,667			
Total of Pigs - -	3,398,971	3,650,453	—	251,482

The areas under the principal crops, and the live stock in each county of Great Britain, are shown in the following tables :—

PRELIMINARY STATEMENT of the ACREAGE under WHEAT, BRITAIN, compiled from the Returns collected on the

COUNTIES.	Wheat.		Barley.		Oats.	
	1901.	1900.	1901.	1900.	1901.	1900.
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
TOTAL FOR GREAT BRITAIN	1,700,965	1,845,042	1,972,448	1,990,265	2,996,902	3,026,088
ENGLAND - -	1,617,721	1,744,556	1,635,426	1,645,022	1,831,740	1,860,513
WALES - - -	47,019	51,654	101,907	105,048	208,773	216,447
SCOTLAND - -	36,225	48,832	235,115	240,195	956,389	949,128
ENGLAND.						
BEDFORD - - -	35,227	37,149	18,529	19,473	17,905	18,779
BERKS - - -	35,235	36,034	27,422	27,270	31,788	32,943
BUCKINGHAM - -	31,862	34,298	18,191	18,682	28,044	29,803
CAMBRIDGE - -	93,514	95,439	53,896	52,484	46,389	49,619
CHESTER - - -	12,223	16,740	2,106	1,630	62,556	61,019
CORNWALL - -	24,217	28,010	32,347	32,300	64,150	64,340
CUMBERLAND - -	1,869	3,174	1,954	1,988	71,830	73,030
DERBY - - -	12,890	15,560	6,062	6,133	23,961	24,543
DEVON - - -	50,520	57,376	44,022	44,235	122,627	122,025
DORSET - - -	20,615	21,817	29,521	29,075	27,740	28,779
DURHAM - - -	8,794	14,114	18,486	17,492	34,590	32,750
ESSEX - - -	110,826	113,722	82,679	84,059	59,894	62,336
GLOUCESTER - -	43,301	47,379	28,919	28,237	31,655	33,553
HANTS - - -	55,078	59,880	40,706	40,863	73,836	76,417
HEREFORD - -	22,568	25,356	19,828	20,246	23,638	24,808
HERTFORD- - -	47,542	51,391	27,749	27,766	34,631	36,237
HUNTINGDON - -	31,563	31,161	20,445	20,957	12,287	12,842
KENT - - -	42,376	42,993	36,165	36,748	44,497	47,413
LANCASTER - -	17,329	21,259	7,877	6,321	72,202	72,776
LEICESTER- - -	21,708	24,193	12,842	13,822	24,635	24,968
LINCOLN - - -	173,098	175,288	207,940	211,471	119,347	125,378
LONDON - - -	87	94	35	66	141	124
MIDDLESEX - -	3,008	3,159	835	759	2,534	2,972
MONMOUTH - -	5,566	6,824	4,538	5,020	8,558	8,942
NORFOLK - - -	118,323	126,574	200,014	200,409	67,273	63,959
NORTHAMPTON - -	44,399	43,187	42,164	43,676	25,706	27,714
NORTHUMBERLAND -	4,061	6,776	34,848	34,837	45,271	44,342
NOTTS - - -	36,626	39,067	36,735	38,073	35,472	34,522
OXFORD - - -	34,540	36,180	41,886	42,016	30,387	31,912
RUTLAND - - -	4,991	4,790	9,579	10,697	3,632	3,964
SALOP - - -	27,934	32,219	52,832	53,848	41,049	40,969
SOMERSET - - -	29,894	32,329	28,408	28,593	25,467	27,266
STAFFORD - - -	17,775	22,798	17,243	16,987	37,574	37,522
SUFFOLK - - -	99,601	105,806	134,971	136,682	44,002	42,498
SURREY - - -	18,125	19,722	8,429	7,773	21,943	23,918
SUSSEX - - -	49,939	52,244	12,099	11,911	58,378	61,076
WARWICK - - -	32,140	36,927	14,097	13,383	29,536	29,558
WESTMORLAND - -	130	169	775	794	14,508	14,995
WILTS - - -	50,177	53,507	39,606	40,030	45,434	46,333
WORCESTER - -	27,009	31,009	9,593	9,549	19,955	19,259
YORK, E. RIDING -	60,204	64,254	73,202	73,623	95,727	95,231
,, N. RIDING -	18,745	27,200	78,368	76,388	75,117	73,179
,, W. RIDING -	42,092	47,388	57,483	58,656	75,874	75,900

BARLEY, and OATS in the several COUNTIES OF GREAT
4th June, 1901, with a COMPARATIVE STATEMENT for 1900.

COUNTIES (*Continued*).	Wheat.		Barley.		Oats.	
	1901.	1900.	1901.	1900.	1901.	1900.
WALES.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
ANGLESEY - -	374	219	1,534	1,615	19,268	19,778
BRECON - - -	3,255	3,731	4,416	4,629	12,236	12,949
CARDIGAN - -	5,751	6,176	15,433	15,415	26,278	26,883
CARMARTHEN - -	8,001	8,490	13,991	14,331	27,310	29,208
CARNARVON - -	535	363	5,394	5,690	10,578	10,698
DENBIGH - -	5,619	5,787	13,738	14,180	24,426	24,691
FLINT - - -	3,618	4,318	5,790	5,687	10,915	11,296
GLAMORGAN - -	4,635	5,285	7,431	8,138	10,835	11,513
MERIONETH - -	803	836	4,047	3,997	8,683	9,074
MONTGOMERY - -	8,867	10,111	8,217	8,446	20,514	21,011
PEMBROKE - -	2,878	3,260	18,443	19,220	26,031	27,231
RADNOR - - -	2,683	3,078	3,473	3,700	11,699	12,115
SCOTLAND.						
ABERDEEN - -	10	17	27,628	29,619	185,565	182,517
ARGYLL - - -	1	1	1,510	1,635	17,239	17,349
AYR - - -	873	976	1,651	1,661	43,198	44,412
BANFF - - -	11	52	9,814	10,158	47,945	47,367
BERWICK - -	1,081	1,903	20,885	21,139	33,815	33,122
BUTE - - -	5	...	90	133	4,929	4,902
CAITHNESS - -	7	4	1,151	1,212	33,610	33,699
CLACKMANNAN -	182	282	492	494	2,938	2,912
DUMBARTON - -	806	1,037	282	289	6,666	6,704
DUMFRIES - -	105	123	754	659	41,512	42,732
EDINBURGH - -	3,536	4,104	5,786	6,098	23,009	22,799
ELGIN or MORAY -	706	886	13,835	14,141	21,428	20,421
FIFE - - -	7,466	10,028	23,132	22,569	38,872	38,665
FORFAR - - -	7,086	8,640	30,474	30,472	48,890	46,817
HADDINGTON - -	4,041	5,162	16,135	16,340	17,670	16,815
INVERNESS - -	38	36	7,195	7,526	30,262	30,048
KINCARDINE - -	393	793	13,381	13,958	27,675	27,189
KINROSS - - -	18	14	493	482	6,327	6,261
KIRCUDBRIGHT -	81	49	35	65	26,627	27,310
LANARK - - -	1,491	2,580	324	355	36,260	36,648
LINLITHGOW - -	879	1,300	3,434	3,414	9,804	9,482
NAIRN - - -	...	...	3,403	3,489	5,473	5,462
ORKNEY - - -	...	...	4,527	4,594	33,554	33,392
PEEBLES - -	6	24	417	436	7,827	8,036
PERTH - - -	3,570	5,764	15,573	15,460	65,427	63,731
RENFREW - -	1,304	1,583	80	57	10,509	10,961
ROSS and CROMARTY	601	789	12,597	12,707	30,171	29,868
ROXBURGH - -	289	488	12,883	13,224	28,414	28,740
SELKIRK - - -	...	8	334	441	4,821	4,880
SHETLAND - -	...	...	1,711	1,746	7,546	7,526
STIRLING - -	1,347	1,821	3,127	3,255	17,808	17,797
SUTHERLAND - -	...	..	1,264	1,371	7,887	7,817
WIGTOWN - -	292	368	718	996	32,711	32,747

PRELIMINARY STATEMENT of the ACREAGE under CLOVER and
compiled from the Returns collected on the

COUNTIES.	Clover and Rotation Grasses.					
	FOR HAY.		NOT FOR HAY.		TOTAL.	
	1901.	1900.	1901.	1900.	1901.	1900.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
TOTAL FOR GREAT BRITAIN -	2,356,415	2,201,781	2,499,972	2,557,377	4,856,387	4,759,158
ENGLAND - -	1,730,155	1,598,566	1,132,503	1,169,472	2,862,658	2,768,038
WALES - - -	201,943	196,992	198,325	199,690	400,268	396,682
SCOTLAND - -	424,317	406,223	1,169,144	1,188,215	1,593,461	1,594,438
ENGLAND.						
BEDFORD - - -	20,941	18,308	7,031	8,163	27,972	26,471
BERKS . - -	34,552	33,721	8,049	8,232	42,601	41,953
BUCKINGHAM - -	28,342	24,866	7,001	6,604	35,343	31,470
CAMBRIDGE - -	41,168	36,434	19,701	20,732	60,869	57,166
CHESTER - - -	59,871	56,738	14,111	14,249	73,982	70,987
CORNWALL- - -	51,023	49,720	137,003	139,593	188,026	189,313
CUMBERLAND - -	42,700	42,367	73,048	73,165	115,748	115,532
DERBY - - -	18,701	17,424	5,995	7,273	24,696	24,697
DEVON - - -	76,521	74,386	140,515	144,705	217,036	219,091
DORSET - - -	31,432	29,703	17,639	17,230	49,071	46,933
DURHAM - - -	39,967	38,728	12,414	13,052	52,381	51,780
ESSEX - - -	67,969	62,411	34,766	35,132	102,735	97,543
GLOUCESTER - -	57,935	53,432	36,661	35,782	94,596	89,214
HANTS - - -	87,017	83,574	28,758	29,546	115,775	113,120
HEREFORD- - -	25,124	22,879	15,402	15,358	40,526	38,237
HERTFORD- - -	38,776	35,227	9,517	10,440	48,293	45,667
HUNTINGDON - -	14,289	12,854	6,459	7,212	20,748	20,066
KENT- - - -	38,374	36,632	11,671	12,364	50,045	48,996
LANCASTER - -	71,745	69,253	11,395	12,121	83,140	81,374
LEICESTER- - -	19,249	16,888	5,778	5,780	25,027	22,668
LINCOLN - - -	95,226	81,366	100,324	105,743	195,550	187,109
LONDON - - -	49	84	131	58	180	142
MIDDLESEX - -	1,694	1,336	524	554	2,218	1,890
MONMOUTH - -	11,342	10,289	5,285	4,079	16,627	14,368
NORFOLK - - -	139,003	130,780	31,355	32,367	170,358	163,147
NORTHAMPTON - -	26,840	23,512	8,745	10,143	35,585	33,655
NORTHUMBERLAND -	42,102	40,582	35,470	36,075	77,572	76,657
NOTTS - - -	30,162	25,468	28,239	28,789	58,401	54,257
OXFORD - - -	40,696	37,103	11,488	13,008	52,184	50,111
RUTLAND - - -	3,609	3,114	2,749	3,135	6,358	6,249
SALOP - - -	49,516	45,267	23,547	25,882	73,063	71,149
SOMERSET - - -	29,875	27,285	22,866	22,854	52,741	50,139
STAFFORD - - -	34,381	30,828	14,772	14,681	49,153	45,509
SUFFOLK - - -	71,108	65,666	37,143	41,321	108,251	106,987
SURREY - - -	18,164	16,873	5,551	5,335	23,715	22,208
SUSSEX - - -	44,257	41,038	16,873	20,110	61,130	61,148
WARWICK - - -	26,833	24,914	8,106	8,260	34,939	33,174
WESTMORLAND - -	7,068	7,567	9,009	9,332	16,077	16,899
WILTS - - -	59,098	55,703	18,854	18,510	77,952	74,213
WORCESTER - -	19,181	17,105	10,153	11,031	29,334	28,136
YORK, E. RIDING -	22,544	18,347	73,981	73,885	96,525	92,232
,, N. RIDING -	41,031	35,750	34,732	36,168	75,763	71,918
,, W. RIDING -	50,680	43,044	29,692	31,419	80,372	74,463

ROTATION GRASSES in the several COUNTIES of GREAT BRITAIN, 4th June, 1901, with a COMPARATIVE STATEMENT for 1900.

COUNTIES (*Continued*).	Clover and Rotation Grasses.					
	FOR HAY.		NOT FOR HAY.		TOTAL.	
	1901.	1900.	1901.	1900.	1901.	1900.
WALES.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
ANGLESEY - - -	22,638	21,695	24,559	23,026	47,197	44,721
BRECON - - - -	7,765	8,043	12,706	12,850	20,471	20,893
CARDIGAN - - -	21,055	21,229	28,924	30,766	49,979	51,995
CARMARTHEN - -	19,887	19,260	16,695	14,655	36,582	33,915
CARNARVON - -	19,234	20,003	19,795	21,279	39,029	41,282
DENBIGH - - -	26,319	24,463	27,195	28,005	53,514	52,468
FLINT - - - -	14,275	13,826	8,903	9,948	23,178	23,774
GLAMORGAN - -	16,347	14,961	9,368	6,863	25,715	21,824
MERIONETH - -	9,641	9,868	8,999	8,830	18,640	18,698
MONTGOMERY - -	17,235	16,874	13,847	14,067	31,082	30,941
PEMBROKE - -	19,691	19,171	19,321	20,827	39,012	39,998
RADNOR - - -	7,856	7,599	8,013	8,574	15,869	16,173
SCOTLAND.						
ABERDEEN - - -	50,433	46,904	233,065	235,641	283,498	282,545
ARGYLL - - - -	11,521	11,187	15,372	15,635	26,893	26,822
AYR - - - - -	33,437	32,566	65,619	68,841	99,056	101,407
BANFF - - - -	10,486	9,342	56,893	58,257	67,379	67,599
BERWICK - - -	10,108	9,984	49,573	48,483	59,681	58,467
BUTE - - - - -	2,278	2,182	5,887	6,474	8,165	8,656
CAITHNESS - - -	9,784	9,553	23,582	22,736	33,366	32,289
CLACKMANNAN - -	1,817	1,792	1,383	1,639	3,200	3,431
DUMBARTON - -	7,335	6,989	10,790	9,928	18,125	16,917
DUMFRIES - - -	17,953	18,228	63,833	62,650	81,786	80,878
EDINBURGH - -	13,611	13,154	20,283	18,647	33,894	31,801
ELGIN, or MORAY -	6,191	5,752	32,306	33,704	38,497	39,456
FIFE - - - - -	28,105	25,991	38,432	38,350	66,537	64,341
FORFAR - - - -	21,033	20,551	66,186	65,468	87,219	86,019
HADDINGTON - -	11,311	10,673	17,720	17,356	29,031	28,029
INVERNESS - -	12,025	11,101	19,363	19,118	31,388	30,219
KINCARDINE - -	13,455	12,862	34,383	34,470	47,838	47,332
KINROSS - - -	2,985	2,644	8,957	9,183	11,942	11,827
KIRKCUDBRIGHT -	9,368	9,144	53,723	54,229	63,091	63,373
LANARK - - -	35,357	34,509	51,645	58,187	87,002	92,696
LINLITHGOW - -	8,349	7,499	8,948	9,614	17,297	17,113
NAIRN - - - -	2,060	1,846	8,249	8,538	10,309	10,384
ORKNEY - - - -	9,891	8,471	24,053	25,709	33,944	34,180
PEEBLES - - -	2,447	2,313	13,984	15,396	16,431	17,709
PERTH - - - -	31,482	30,368	70,293	69,550	101,775	99,918
RENFREW - - -	14,218	14,099	11,491	11,558	25,709	25,657
ROSS and CROMARTY -	14,783	13,886	28,428	30,456	43,211	44,342
ROXBURGH - - -	8,795	8,637	45,027	43,735	53,822	52,372
SELKIRK - - -	909	939	7,856	8,194	8,765	9,133
SHETLAND - - -	780	767	634	608	1,414	1,375
STIRLING - - -	13,209	12,999	18,835	18,597	32,044	31,596
SUTHERLAND - -	3,932	4,072	4,872	4,536	8,804	8,608
WIGTOWN - - -	4,869	5,219	57,479	62,728	62,348	67,947

PRELIMINARY STATEMENT of the ACREAGE under Permanent
from the Returns collected on the 4th June, 1901.

Counties.	Permanent Grass. For Hay. 1901.	For Hay. 1900.	Not for Hay. 1901.	Not for Hay. 1900.	Total. 1901.	Total. 1900.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
TOTAL FOR GREAT BRITAIN	4,350,459	4,373,099	12,476,790	12,355,936	16,827,249	16,729,035
ENGLAND - -	3,754,836	3,776,473	9,702,824	9,615,404	13,457,660	13,391,877
WALES - - -	463,704	464,870	1,477,661	1,464,175	1,941,365	1,929,045
SCOTLAND - -	131,919	131,756	1,296,305	1,276,357	1,428,224	1,408,113
ENGLAND.						
Bedford - - -	27,865	28,215	76,194	74,579	104,059	102,794
Berks - - -	72,059	70,876	99,129	98,428	171,188	169,304
Buckingham - -	87,472	88,292	156,468	155,595	243,940	243,887
Cambridge - -	36,391	35,433	79,970	81,888	116,361	117,321
Chester - - -	91,232	89,693	248,065	249,330	339,297	339,023
Cornwall - - -	32,637	32,069	212,453	206,737	245,090	238,806
Cumberland - -	72,308	72,425	275,433	272,603	347,741	344,428
Derby - - -	124,694	127,300	278,952	274,530	403,646	401,830
Devon - - -	109,284	111,119	535,664	523,308	644,948	634,427
Dorset - - -	86,410	89,518	211,611	209,794	298,021	299,312
Durham - - -	93,995	91,185	188,138	189,005	282,133	280,190
Essex - - - -	95,891	94,781	174,049	177,126	269,940	271,907
Gloucester - -	140,872	148,198	259,144	249,520	400,016	397,718
Hants - - -	84,282	90,010	200,565	194,093	284,847	284,103
Hereford - - -	77,786	77,855	221,704	219,566	299,490	297,421
Hertford - - -	54,604	53,863	66,226	66,824	120,830	120,687
Huntingdon - -	21,256	21,558	64,388	62,593	85,644	84,151
Kent - - - -	102,222	99,337	314,111	315,750	416,333	415,087
Lancaster - -	196,816	198,044	379,485	378,572	576,301	576,616
Leicester - - -	87,622	89,034	272,188	270,090	359·810	359,124
Lincoln - - -	91,249	88,430	407,937	410,773	499,186	499,203
London - - -	3,532	3,586	4,828	5,189	8,360	8,775
Middlesex - - -	44,746	45,765	27,741	27,450	72,487	73,215
Monmouth - -	63,340	65,115	133,449	131,430	196,789	196,545
Norfolk - - -	44,048	45,677	244,467	243,512	288,515	289,189
Northampton - -	81,782	81,207	275,069	273,705	356,851	354,912
Northumberland -	72,696	71,930	421,951	420,230	494,647	492,160
Notts - - -	61,547	62,230	147,833	147,044	209,380	209,274
Oxford - - -	72,687	73,300	123,405	120.416	196,092	193,716
Rutland - - -	11,399	10,432	40,908	40,514	52,307	50,946
Salop - - -	98,265	97,247	363,527	360,780	461,792	458,027
Somerset - . -	220,902	234,469	437,176	420,190	658,078	654,659
Stafford - - -	118,104	119,493	312,429	309,928	430,533	429,421
Suffolk - - -	57,849	54,365	125,582	126,347	183,431	180,712
Surrey - - -	71,005	71,208	84,963	84,785	155,968	155,993
Sussex - - -	132,869	129,526	265,835	262,814	398,704	392,340
Warwick - - -	95,836	98,382	239,764	236,201	335,600	334,583
Westmorland - -	53,871	53,802	154,650	152,558	208,521	206,360
Wilts - - . -	139,251	142,148	287,473	281,736	426,724	423,884
Worcester - -	84,593	87,365	169,321	164,640	253,914	252,005
York, E. Riding -	39,460	37,569	171,919	173,651	211,379	211,220
,, N. Riding -	139,471	136,844	382,153	382,128	521,624	518,972
,, W. Riding -	260,636	257,578	566,507	70,052	827,143	827,630

GRASS in the several COUNTIES of GREAT BRITAIN, compiled with a COMPARATIVE STATEMENT for 1900.

COUNTIES (*Continued*).	Permanent Grass.					
	For Hay.		Not for Hay.		Total.	
	1901.	1900.	1901.	1900.	1901.	1900.
WALES.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
ANGLESEY - - -	12,892	12,828	62,131	63,982	75,023	76,810
BRECON - - -	36,332	35,936	119,073	117,272	155,405	153,208
CARDIGAN - - -	35,202	35,395	124,670	121,510	159,872	156,905
CARMARTHEN - -	76,974	77,501	267,978	267,271	344,952	344,772
CARNARVON - -	38,581	38,014	79,359	77,866	117,940	115,880
DENBIGH - - -	32,030	31,347	122,611	123,075	154,641	154,422
FLINT - - -	18,086	17,014	56,752	55,798	74,838	72,812
GLAMORGAN - -	66,127	69,194	144,984	145,181	211,111	214,375
MERIONETH - -	35,349	34,885	81,720	81,674	117,069	116,559
MONTGOMERY - -	47,260	46,443	147,356	145,656	194,616	192,099
PEMBROKE - - -	41,463	42,291	172,170	168,194	213,633	210,485
RADNOR - - -	23,408	24,022	98,857	96,696	122,265	120,718
SCOTLAND.						
ABERDEEN - - -	1,044	1,601	31,975	31,979	33,019	33,580
ARGYLL - - -	15,012	14,814	65,194	63,920	80,206	78,734
AYR - - - -	16,761	16,166	141,873	138,462	158,634	154,628
BANFF - - -	295	181	9,270	9,358	9,565	9,539
BERWICK - - -	1,033	1,569	42,393	42,064	43,426	43,633
BUTE - - - -	592	397	9,208	8,907	9,800	9,304
CAITHNESS - - -	1,408	1,476	27,570	27,444	28,978	28,920
CLACKMANNAN - -	634	656	5,787	5,581	6,421	6,237
DUMBARTON - -	1,459	1,409	19,765	20,861	21,224	22,270
DUMFRIES - - -	18,282	18,336	94,466	93,444	112,748	111,780
EDINBURGH - -	1,810	2,167	43,902	45,658	45,712	47,825
ELGIN, or MORAY -	176	242	8,766	7,979	8,942	8,221
FIFE - - - -	3,453	3,277	72,467	72,601	75,920	75,878
FORFAR - - -	984	1,459	27,496	28,054	28,480	29,513
HADDINGTON - -	728	1,125	18,561	18,544	19,289	19,669
INVERNESS - - -	4,712	4,835	57,322	58,475	62,034	63,310
KINCARDINE - -	154	134	9,463	9,353	9,617	9,487
KINROSS - - -	741	762	12,194	12,263	12,935	13,025
KIRKCUDBRIGHT -	13,209	12,938	73,524	72,685	86,733	85,623
LANARK - - -	11,182	10,033	99,830	93,483	111,012	103,516
LINLITHGOW - -	864	943	20,014	19,805	20,878	20,748
NAIRN - - -	21	18	1,945	1,829	1,966	1,847
ORKNEY - - -	803	782	16,251	16,493	17,054	17,275
PEEBLES - - -	1,442	1,277	18,340	16,632	19,782	17,909
PERTH - - -	9,293	9,903	95,567	95,842	104,860	105,745
RENFREW - - -	5,437	5,485	42,116	41,522	47,553	47,007
ROSS and CROMARTY -	2,270	2,207	27,026	25,529	29,296	27,736
ROXBURGH - -	5,673	6,264	56,841	56,539	62,514	62,803
SELKIRK - - -	1,230	1,397	11,974	11,140	13,204	12,537
SHETLAND - - -	1,604	1,576	41,855	42,030	43,459	43,606
STIRLING - - -	3,803	3,376	48,569	48,550	52,372	51,926
SUTHERLAND - -	1,259	1,219	8,562	8,756	9,821	9,975
WIGTOWN - - -	4,551	3,732	36,219	30,575	40,770	34,307

PRELIMINARY STATEMENT of the NUMBER of CATTLE, SHEEP,
from the Returns collected on the 4th June, 1901,

COUNTIES.	Cattle.		Sheep.		Pigs.	
	1901.	1900.	1901.	1900.	1901.	1900.
	No.	*No.*	*No.*	*No.*	*No.*	*No.*
TOTAL FOR GREAT BRITAIN -	6,763,894	6,805,170	26,377,200	26,592,226	2,179,925	2,381,932
ENGLAND - -	4,791,535	4,848,698	15,548,057	15,844,713	1,842,133	2,021,422
WALES - - -	743,078	758,386	3,427,734	3,432,516	212,971	228,097
SCOTLAND - -	1,229,281	1,198,086	7,401,409	7,314,997	124,821	132,413
ENGLAND.						
BEDFORD - - -	33,419	34,833	104,407	104,759	24,506	25,280
BERKS - - -	43,608	45,161	170,619	184,797	19,218	22,130
BUCKINGHAM - -	73,390	75,183	191,700	195,567	26,355	28,098
CAMBRIDGE - -	55,147	57,112	202,307	208,272	41,819	46,180
CHESTER - - -	179,218	182,633	102,402	103,456	66,999	70,126
CORNWALL - - -	205,033	203,983	394,301	399,756	81,786	88,559
CUMBERLAND - -	150,384	148,339	609,665	580,618	17,461	18,816
DERBY - - -	143,712	143,609	166,265	171,364	28,632	31,108
DEVON - -	278,297	279,728	815,694	846,324	89,239	95,944
DORSET - - -	86,675	87,904	351,625	360,491	46,298	50,930
DURHAM - - -	77,797	78,183	251,896	258,257	10,381	10,624
ESSEX - - -	86,097	90,807	265,096	295,334	67,824	80,866
GLOUCESTER - -	123,441	124,708	360,169	364,785	61,509	67,438
HANTS - - -	82,668	86,666	360,710	378,951	57,048	63,302
HEREFORD - - -	92,522	96,503	331,875	333,270	22,533	24,286
HERTFORD - - -	34,497	35,732	106,952	112,413	21,396	24,424
HUNTINGDON - -	28,794	30,746	85,393	96,459	15,478	17,443
KENT - - - -	73,047	77,662	856,430	917,237	55,564	58,361
LANCASTER - -	240,484	239,501	335,392	334,859	58,921	60,617
LEICESTER - - -	139,195	141,876	306,424	321,029	21,696	24,569
LINCOLN - - -	245,278	256,942	1,117,899	1,159,603	94,924	102,392
LONDON - - -	5,290	5,409	4,038	4,262	2,134	2,518
MIDDLESEX - -	15,757	16,456	18,088	16,175	11,544	11,685
MONMOUTH - -	48,270	49,799	227,932	227,142	14,658	16,426
NORFOLK - - -	143,543	134,527	552,142	547,245	85,565	100,712
NORTHAMPTON - -	121,190	126,341	386,400	403,434	24,466	28,340
NORTHUMBERLAND -	114,521	113,724	1,067,379	1,065,206	9,692	10,250
NOTTS - - -	83,447	86,091	198,934	196,680	26,482	28,295
OXFORD - - -	59,447	61,851	231,650	230,325	28,618	31,032
RUTLAND - - -	18,205	19,118	80,834	84,794	2,026	2,277
SALOP - - -	179,160	180,113	469,768	470,577	62,555	66,594
SOMERSET - - -	237,618	239,663	500,569	519,670	104,810	118,884
STAFFORD - - -	165,888	164,058	228,275	236,351	46,524	50,533
SUFFOLK - - -	78,276	78,426	428,456	433,013	133,218	149,030
SURREY - -	41,349	42,751	67,452	69,757	18,853	21,017
SUSSEX - - -	112,069	115,877	413,929	434,236	35,749	38,781
WARWICK - - -	106,828	108,592	262,506	272,189	31,366	36,405
WESTMORLAND - -	70,226	67,608	372,248	374,453	3,960	4,274
WILTS - - -	113,275	115,900	486,023	520,888	51,290	60,334
WORCESTER - -	68,355	69,057	163,801	170,617	36,954	39,794
YORK, E. RIDING -	86,683	88,860	467,364	429,856	51,847	56,074
,, N. RIDING -	172,809	174,744	738,094	733,757	47,331	47,673
,, W. RIDING -	276,626	271,922	694,954	676,485	82,904	89,001

and PIGS in the several COUNTIES of GREAT BRITAIN, compiled with a COMPARATIVE STATEMENT for 1900.

COUNTIES (*Continued*).	Cattle.		Sheep.		Pigs.	
	1901.	1900.	1901.	1900.	1901.	1900.
WALES.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
ANGLESEY - - -	55,711	56,653	83,849	82,145	15,166	15,438
BRECON - - -	41,379	41,920	488,195	489,417	7,571	8,232
CARDIGAN - - -	70,428	72,229	272,404	274,955	20,776	22,897
CARMARTHEN - -	121,536	123,361	274,255	271,869	33,930	36,514
CARNARVON - -	56,120	57,357	266,589	269,692	18,366	19,028
DENBIGH - - -	68,651	70,882	342,314	339,502	24,473	26,409
FLINT - - -	37,053	38,426	84,348	86,215	17,110	18,124
GLAMORGAN - -	56,259	56,485	330,816	330,060	15,122	16,406
MERIONETH - -	38,354	39,518	430,356	433,727	7,718	8,137
MONTGOMERY - -	72,832	73,273	435,011	433,145	20,410	22,521
PEMBROKE- - -	91,672	93,744	138,429	138,199	27,643	29,482
RADNOR - - -	33,083	34,538	281,168	283,590	4,686	4,909
SCOTLAND.						
ABERDEEN - - -	180,927	175,482	226,680	228,315	10,720	11,815
ARGYLL - - -	60,645	60,900	926,143	936,337	4,050	4,020
AYR - - - -	101,369	101,090	381,885	381,960	13,324	14,612
BANFF - - -	44,861	44,249	64,247	70,000	2,765	2,775
BERWICK - - -	16,905	16,787	325,324	313,162	3,365	3,503
BUTE - - - -	9,512	9,554	44,908	46,588	600	589
CAITHNESS- - -	22,521	22,109	131,196	127,279	1,491	1,485
CLACKMANNAN - -	3,685	3,516	12,390	12,876	1,828	1,660
DUMBARTON - -	14,945	15,251	70,288	70,579	1,499	1,803
DUMFRIES - - -	63,974	62,137	579,896	559,565	9,116	9,482
EDINBURGH - -	19,865	20,080	185,759	182,666	7,628	7,511
ELGIN, or MORAY -	22,671	21,640	67,312	69,412	2,302	2,413
FIFE - - - -	51,352	47,673	115,029	109,780	4,746	5,511
FORFAR - - -	55,772	50,090	161,806	162,168	6,380	6,675
HADDINGTON - -	9,890	8,958	127,047	120,590	1,415	1,631
INVERNESS- - -	51,483	51,520	596,263	606,350	2,466	2,419
KINCARDINE - -	26,497	25,353	44,600	43,238	2,122	2,456
KINROSS - - -	7,162	6,627	35,788	37,409	460	565
KIRKCUDBRIGHT -	50,361	49,949	406,880	392,229	7,094	7,413
LANARK - - -	75,121	73,335	242,306	245,665	6,180	6,709
LINLITHGOW - -	12,366	12,215	23,782	22,095	1,499	1,751
NAIRN - - -	6,247	6,047	21,284	19,526	686	634
ORKNEY - - -	28,728	28,056	35,327	35,789	2,532	2,307
PEEBLES - - -	7,304	7,124	202,018	196,799	589	532
PERTH - - -	75,900	73,097	723,256	710,933	6,816	7,212
RENFREW - - -	26,997	26,155	39,813	40,072	1,053	1,178
ROSS and CROMARTY -	44,367	43,550	310,745	307,256	3,919	4,245
ROXBURGH - -	17,859	17,851	539,486	520,410	2,664	3,001
SELKIRK - - -	3,084	3,075	183,796	179,040	367	346
SHETLAND- - -	19,050	18,679	115,311	110,573	2,240	2,445
STIRLING - - -	34,269	33,377	124,178	123,930	2,200	2,278
SUTHERLAND - -	12,210	12,077	205,746	204,467	737	816
WIGTOWN - - -	51,382	50,483	130,920	127,939	9,968	10,621

ACREAGE OF POTATOES.

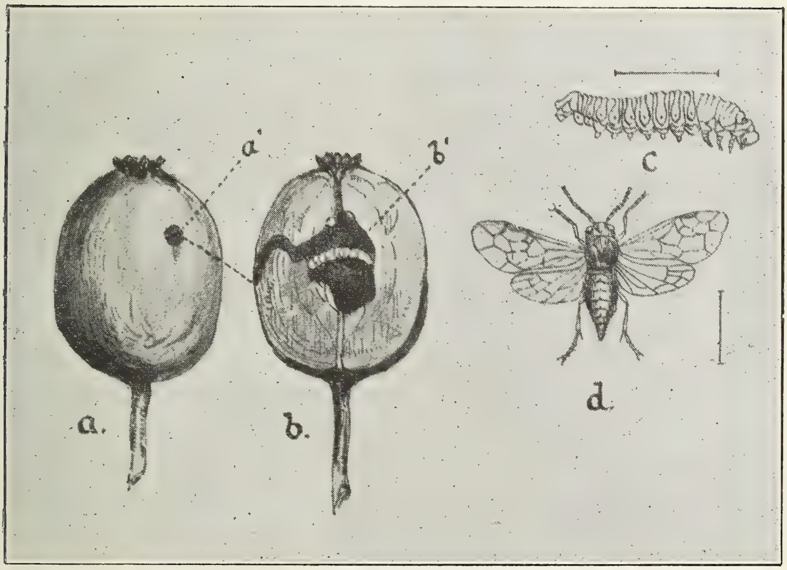
COUNTIES.	1901.	1900.	COUNTIES. (*Continued*).	1901.	1900.
	Acres.	*Acres.*	WALES.	*Acres.*	*Acres.*
TOTAL FOR GREAT BRITAIN	577,260	561,361	ANGLESEY - -	2,665	2,795
			BRECON - -	1,052	1,133
			CARDIGAN - -	5,918	6,140
ENGLAND -	415,105	396,936	CARMARTHEN -	3,694	3,856
WALES - - -	31,979	33,225	CARNARVON - -	4,187	4,339
SCOTLAND - -	130,176	131,200	DENBIGH - -	3,177	3,346
			FLINT - - -	2,312	2,263
ENGLAND.			GLAMORGAN -	1,905	1,998
BEDFORD - - .	9,829	8,907	MERIONETH - -	1,776	1,849
BERKS - - -	1,830	1,900	MONTGOMERY -	1,992	2,060
BUCKINGHAM - -	1,710	1,586	PEMBROKE - -	2,433	2,563
CAMBRIDGE - -	25,501	22,790	RADNOR - -	868	883
CHESTER - - -	24,892	25,514			
CORNWALL - -	5,554	5,601			
CUMBERLAND - -	8,436	8,863	SCOTLAND.		
DERBY - - -	2,563	2,580	ABERDEEN - -	7,477	7,373
DEVON - - -	12,911	12,468	ARGYLL - -	4,538	4,558
DORSET - - -	1,898	1,961	AYR - - -	8,193	8,340
DURHAM - . -	9,854	9,399	BANFF - - -	2,033	2,007
ESSEX - - -	9,966	9,629	BERWICK - -	2,205	2,379
GLOUCESTER - -	4,074	4,048	BUTE - - -	941	974
HANTS - -	5,976	5,980	CAITHNESS - -	1,675	1,658
HEREFORD - -	1,932	1,970	CLACKMANNAN -	403	407
HERTFORD - -	5,233	4,257	DUMBARTON - -	2,402	2,444
HUNTINGDON - -	9,025	8,687	DUMFRIES - -	3,452	3,617
KENT - - -	13,632	13,302	EDINBURGH - -	5,704	5,458
LANCASTER - -	43,340	41,932	ELGIN, or MORAY -	1,763	1,678
LEICESTER - -	2,146	2,222	FIFE - - -	15,252	15,042
LINCOLN - - -	69,434	64,146	FORFAR - - -	12,146	12,606
LONDON - - -	369	413	HADDINGTON -	7,981	7,750
MIDDLESEX - -	2,645	2,517	INVERNESS - -	5,977	6,071
MONMOUTH - -	1,403	1,470	KINCARDINE - -	2,448	2,554
NORFOLK - - -	12,971	11,179	KINROSS - -	652	618
NORTHAMPTON - -	3,854	3,216	KIRKCUDBRIGHT -	1,526	1,575
NORTHUMBERLAND -	5,060	5,041	LANARK - -	4,536	4,446
NOTTS - - -	8,087	8,007	LINLITHGOW -	1,849	1,841
OXFORD - - -	2,953	2,483	NAIRN - - -	354	323
RUTLAND - - -	214	158	ORKNEY - -	2,760	2,783
SALOP - - -	6,614	6,694	PEEBLES - -	361	392
SOMERSET - - -	5,130	4,997	PERTH - -	12,490	12,884
STAFFORD - - -	11,044	11,465	RENFREW - -	3,022	2,994
SUFFOLK - - -	2,877	2,577	ROSS and CROMARTY	7,374	7,405
SURREY - - -	5,770	5,609	ROXBURGH - -	1,236	1,375
SUSSEX - - -	3,695	3,470	SELKIRK - -	184	197
WARWICK - - -	6,929	6,744	SHETLAND - -	3,040	3,046
WESTMORLAND - -	1,440	1,440	STIRLING - .	3,146	3,252
WILTS - - -	3,023	2,960	SUTHERLAND -	1,680	1,663
WORCESTER - -	6,988	7,458	WIGTOWN - -	1,376	1,490
YORK, E. RIDING -	13,435	12,851			
,, N. RIDING -	13,157	12,954			
,, W. RIDING -	27,711	25,491			

ACREAGE OF HOPS.

	Acres.	*Acres.*		*Acres.*	*Acres.*
GLOUCESTER - -	46	47	SUFFOLK - -	4	4
HANTS - -	2,133	2,231	SURREY - -	1,232	1,300
HEREFORD - -	7,497	7,287	SUSSEX - -	4,800	4,823
KENT - - -	31,242	31,514	WORCESTER -	4,029	3,964
SALOP - - -	144	138			
			TOTAL - -	51,127	51,308

THE APPLE SAWFLY.

(*Hoplocampa testudinea*, Cameron.)



a and *b*, diseased apples ; *a'*, exit hole of larva ; *b'*, larva inside apple ; *c*, the adult larva ; *d*, adult sawfly ; lines showing natural size.

During the past two years frequent enquiries have been received concerning the damage caused to apples by the larvæ of a sawfly, popularly called the Apple Sawfly. The attack to some extent resembles that of the Codling Moth, with which it is often confused. It has long been known as an injurious species, for Westwood, as far back as 1847, described the attack from personal observations. Since then notice has frequently been drawn to it in journals of various kinds.

The damage caused by this pest is often very serious, and is far more difficult to control than that of the Codling Moth, which may to some extent be checked by spraying with Paris Green. With the Sawfly attack no such preventive treatment can be adopted, for the adults deposit their

eggs in the blossom of the apple and, in one case reported, the pear. The insect was first described by Klug as *Tenthredo testudinea* (Berl. Mag. VIII., 60.30); Westwood described the attack under the name *Selandra testudinea* in the *Gardener's Chronicle* in 1848 (p. 851); a short account of it is also given by Miss Ormerod in her little handbook on Orchard and Bush Fruit Pests (p. 35).

The larvæ can at once be told from those of the Codling Moth by the presence of six pairs of sucker feet, exclusive of the anal pair, and by their creamy white appearance. Moreover, the damage to the interior of the fruit is different. The Sawfly larvæ eat out large cavities in the centre of the apple, and there is always a circular opening to the exterior even when the larva is quite small.

This damage, of course, checks the growth of the fruitlet, which soon falls; when more mature fruit is attacked the apples decay away, and on opening the diseased apples, large black cavities are found in the interior, filled with "frass" and one or more of the creamy white larvæ.

No one particular variety of apple seems to be preferred, but it has been noticed that low trees are most subject to attack.

It is apparently a somewhat local insect, but where it does occur it often causes very serious loss. All the observations received recently have come from Surrey, Kent, Cambridgeshire, and Bedford. It has been found in Middlesex and Huntingdonshire. Westwood described an attack at Hammersmith. It is also recorded from Hertford and the Manchester district.

Life History.

The female Sawfly is reddish-yellow with a black patch on the head, another on the thorax, and with the dorsum of the abdomen black; the head and mid-division of the thorax are minutely punctured; the reddish-yellow antennæ are dusky in the middle. The legs are yellowish-red; the wings transparent, somewhat iridescent in the sun, with brown veins and dark stigma, except at its end nearest the apex of the wing, where it is yellow. In length the female measures 3¼

to $3\frac{1}{2}$ lines, the male 3 to $3\frac{1}{4}$ lines. It is the largest of the British *Hoplocampæ*, the members of which genus nearly all live inside fruits or galls. One species, however, lives in the rolled-down leaves of the rose (*H. brevis*), and has a green larva, with forked spines, whilst all the other British species are creamy yellow or nearly white in hue.

The female appears in the spring, about the time the apple blossom is bursting. During the present year they were first noticed on the 10th of May; in some years they have been observed in April.

The females may easily be taken on bright days sitting on the apple blossom. They are there to deposit their eggs. The ova are laid down below the calyx, seldom more than one egg to each blossom, but as many as six larvæ have been found in one fruitlet. How many ova each female deposits is not exactly known, the number probably depending upon the state of the weather, for they will only lay their eggs during bright days, and usually they are noticed between 9 and 2 o'clock, seldom later than 3 o'clock.

The period of egg existence seems to be varied. Miss Ormerod says that "from eggs laid on the 14th of May caterpillars were hatching out on the 28th of the same month." During the present year larvæ appeared from the eggs eight days after they were laid by females in the open.

Under certain conditions there may be two broods of this insect, a spring and a summer brood.

The larvæ are creamy-white grub-like creatures, with a dark brown head and a double black chitinous plate on the upper surface of the anal segment when in their young stages; when mature they are about half an inch in length. On the first three segments are six-jointed legs, on the fifth to tenth are pairs of sucker feet, and on the last segment another pair of sucker-feet. The dark anal plates do not show so clearly in the adults, which are more of a mottled grey appearance than the young larvæ.

These grubs burrow into the fruitlets and eat out large cavities, often attacking apples when they are no larger than cobnuts. Each of these large, irregular chambers communi-

cates with the exterior by a small round hole, which is usually noticed near the eye of the apple or on the side. Out of the external opening one frequently finds "frass" and moisture exuding. Attacked fruitlets can thus be easily seen on a tree long before they fall. These larvæ may be found of all sizes in June and July; there are apparently two broods which more or less overlap. The average length of larval life seems to be varied, some mature in four weeks, others take nearly five weeks to attain their full-fed condition. If the fruitlet decays before the larva is full fed the larva leaves it and crawls to another. When the attack has been early and the fruit very small, one larva has been traced to attack and destroy no less than five young apples. They seldom seem to fall with the fruit; either they crawl from one fruit to another, if not mature; or when the fruit they have been feeding on is decayed, they fall from it when mature and pupate in the soil.

The pupæ are buried an inch or so under the earth, up to a depth of four inches according to Miss Ormerod. Frequently the larvæ only just bury themselves. The pupa is encased in a small dull yellow cocoon of silk and saliva, which is coated outside with grains of earth. Larvæ which fell from the apples at the end of May had pupated by the 13th of June. These hatched out into perfect flies on July 7th, forming a second generation. This second generation also lays its eggs in the apple, large fruit being sometimes attacked in July and August. Larvæ have been found as late as September 3rd, but one seldom finds many after the end of July. This second brood remains in the larval state all the winter in the cocoons of silk and earth under the trees. Mature larvæ have been found on May 10th, and at the same time many were found quite small, so that there may be more than two broods. In any case a second generation arises from the spring brood, when the larvæ mature as early as first mentioned.

It is said by some observers that the larvæ do not fall out of the fruit when mature, but fall with the fruit. This certainly is not the rule. One tree examined during the present season had thirty fruitlets that had been attacked

still on the tree, the pupæ were found in the soil beneath. Moreover, on two occasions, the larvæ have been observed to wriggle out of the hole at the side of the apple and fall to the ground. No doubt some fall with the fruit, but only a small percentage. The large hole to the exterior in the infested fruit is very distinctly seen, especially by the "frass" and moisture running from it. This and the position of the insect in its pupal condition are the two points of economic importance to be noticed by orchardists.

Prevention and Treatment.

Little can be done in this attack when the pest have once taken up their abode in the fruitlets, but, as we know, they migrate from one apple to another, it is certainly worth while in young plantations to pick off the diseased fruitlets and destroy them. Spraying would do little good, although it would, of course, if arsenites were used, prevent the grubs from entering fresh fruits, but hand-picking is far preferable when the trees are small. The only other thing to be done is to destroy the larvæ in the winter when they are buried in the cocoons under the soil. These may be got rid of by well working the soil beneath the trees that have been invaded with a prong hoe, and then dressing the ground with gas lime or kainit. Better still would it be to remove three inches of the soil just round the trees, and burn it during the winter. Unless this is done or the apples that are invaded are collected and burnt with the grubs in them the attack will continue from year to year in the same orchard.

No natural enemies of this Sawfly are known, but probably poultry kept in the orchard would destroy these insects in the larval and pupal stages, just as they do those of the Codling Moth, Winter Moth, and others.

AGRICULTURAL IMPORTS OF THE CEREAL YEAR.

In the accompanying table are shown the quantities and values of the principal articles of agricultural produce imported into the United Kingdom during the cereal year 1900-01, the corresponding figures for the preceding year being added for comparison. The particulars have been compiled from the monthly accounts relating to trade and navigation.

Among living animals, for food, there has been a slight increase in cattle and a noticeable falling off in sheep. The cattle received are now almost entirely of North American origin, with about 1,800 head from the Channel Islands. The decline in sheep is, of course, attributable to the stoppage of the Argentine supplies, but it may be noted that the supplies of live sheep from the United States have more than doubled, being over 250,000 as against 120,000 in 1899-1900.

Of meat, both bacon and hams show a slight decline, as does also fresh mutton, although the values of all three, especially mutton, are considerably higher. Over 15,000 tons of fresh beef more than in the previous year were received, but the value was only slightly higher. Fresh pork also came in larger quantities, and preserved meat (whether salted or otherwise) was also generally more plentiful. No very striking change in the source of our meat supplies appears to be recorded.

Nearly three-fourths of the beef comes from the United States, and most of the mutton from New Zealand and Argentina, although Australia also sends considerable quantities. The United States increased their shipments of fresh pork, but did not send so much as Holland. Three-

fourths of the bacon, and nearly all the hams, came from the United States.

A larger quantity of all cereals, except maize, was received than in the previous year. An increase from 31,500,000 to

ARTICLES.		1st Sept., 1899, to 31st Aug., 1900.		1st Sept., 1900, to 31st Aug., 1901.	
		Quantities.	Values.	Quantities.	Values.
			£		£
Horses	No.	52,800	1,357,989	43,627	1,149,119
Cattle	,,	476,131	8,549,974	497,734	8,918,315
Sheep	,,	424,368	672,310	332,443	514,284
Bacon	cwts.	5,671,064	11,175,740	5,627,589	12,851,285
Hams	,,	1,849,000	4,249,482	1,828,424	4,373,512
Beef:					
Salted	,,	178,988	240,709	203,898	263,901
Fresh	,,	4,082,107	7,996,734	4,400,699	8,734,035
Meat unenumerated:					
Salted or fresh	,,	519,928	964,053	571,316	1,070,380
Preserved, otherwise than by salting	,,	781,006	2,312,986	788,043	2,333,382
Mutton, fresh	,,	3,514,310	5,860,660	3,464,763	6,340,909
Pork:					
Salted (not Hams)	,,	247,095	286,559	243,157	307,713
Fresh	,,	663,900	1,421,145	757,714	1,640,276
Rabbits	,,	430,885	686,275	442,832	705,156
Corn:					
Wheat	,,	65,017,168	21,770,949	71,180,630	24,209,144
Wheat Meal and flour	,,	21,553,962	9,973,675	23,349,814	10,914,305
Barley	,,	15,202,455	4,623,115	18,745,910	5,517,183
Oats	,,	19,812,660	5,135,681	22,102,770	5,998,633
Maize	,,	57,746,360	12,364,573	55,805,800	13,055,182
Butter	,,	3,401,532	17,568,932	3,631,949	18,875,109
Margarine	,,	956,199	2,563,757	943,514	2,504,070
Cheese	,,	2,658,991	6,592,205	2,523,670	6,233,236
Milk, condensed	,,	962,803	1,698,485	955,062	1,765,342
,, and cream, fresh and preserved	,,	10,894	13,906	23,360	37,725
Eggs	gt. hundreds	16,698,692	5,253,106	16,779,107	5,370,002
Fruit:					
Apples	cwts.	—	1,192,100	2,323,110	1,356,502
Pears	,,	—	322,532	442,313	346,872
Hops	,,	146,534	566,292	188,873	785,039
Onions	bushels	7,106,905	859,055	7,332,162	844,896
Potatoes	cwts.	6,362,919	1,789,402	9,882,847	2,346,583
Tomatoes	,,	—*	864,106	—*	795,160
Tallow and Stearine	,,	2,296,972	2,962,019	1,826,785	2,322,673
Wool	lbs.	596,212,549	23,990,590	677,028,507	21,612,304
Hides, wet and dry	cwts.	1,483,396	3,607,882	850,730	2,003,292
Lard	,,	1,982,665	3,100,553	2,066,511	3,982,524
Poultry and Game		—	940,726	—	967,789
Vegetables (unenumerated)		—	1,585,355	—	537,258

* Included with Vegetables (unenumerated).

39,250,000 cwts. in the supply of wheat from the United States more than counterbalanced a decline from 18,000,000 cwts. to 11,500,000 cwts. from Argentina. There was further some recovery in the supplies from Roumania, Turkey, and India, and an increase from Australia.

Wheatmeal and flour increased by nearly 2,000,000 cwts., and the total quantity of wheat and flour received was equivalent to 24,176,000 qrs., as compared with 22,156,000 qrs. in 1899-1900.

Russia had a considerable show in the increases recorded in barley and oats, though in the case of the first-named Turkey and Roumania also sent an augmentation sufficient to counterbalance a decline of 3,000,000 cwts. from the United States. Although maize was less in quantity, it was of higher value.

About 2,350,000 cwts. of peas were received, as compared with 2,490,000 cwts. in the earlier year, while beans, on the other hand, showed an increase from 1,575,000 cwts. to 1,860,000 cwts.

Butter and eggs came in increased quantities, but the amount of margarine, cheese, and condensed milk was less. Denmark increased her quota of butter by 117,000 cwts., sending a total of 1,562,000 cwts., but Russia, with 338,000 cwts.—a large increase over the previous year—now takes second place, beating Holland with 304,000 cwts., and France with 301,000 cwts.

The decline in cheese was principally due to decreased shipments from the United States, while the larger Canadian quota increased somewhat. The pre-eminence attained by Russia as a purveyor of eggs was fully maintained.

Among vegetables, the imports of tomatoes may be noticed; they amounted to 864,000 cwts. They were not separately distinguished prior to 1900.

The only other item calling for special remark is wool, of which we received 80,000,000 lbs. more than in 1899-1900; but the value declined from about 9½d. to a little under 7¾d. per lb.

THE LACKEY MOTH (*Clisiocampa neustria*).

(A) Tent and caterpillars. (B) Male, (C) female moth. (D) Egg band on fruit twig.

TENT CATERPILLARS.

Two species of so-called "Tent Caterpillars" are frequently found on various fruit trees, especially on the apple, plum, and pear. By far the commonest and most destructive is the Lackey Moth Caterpillar (*Clisiocampa neustria*). But in parts of England, notably districts in Kent, the somewhat local Brown-Tail Moth (*Porthesia chrysorrhœa*) does almost as much harm in some seasons; this especially applies to the present year, the caterpillars having done considerable damage to apple and plum orchards in parts of Kent. These two insects are called "Tent Caterpillars" on account of the larvæ forming tent-like nests of silk on the trees, in which they live during their early existence, and beneath which they shelter during wet weather and at night when they are more mature.

The damage caused by these two larvæ can easily be prevented, and even when they have obtained a considerable hold on the orchard they can be remedied to some extent by spraying.

Tent Caterpillars also occur in great numbers in America; there, as here, being very ravenous feeders, they soon strip the foliage off the trees, and cause the fruitlets to fall.

As there is some difference in life history as well as in appearance between the two species, they are best considered separately as far as their natural history goes; prevention and treatment are the same for both species.

I.—The Lackey Moth (*Clisiocampa neustria*, Linn.).

The Lackey Moth belongs to the family *Bombycidæ*, a family which does not contain many species in Great Britain. The *Bombycidæ* are more or less hairy moths, the male antennæ are pectinated, the female thread-like. The

larvæ of this family are hairy, but they never have tufts of hair, as is seen in the *Orygias*, or Tussock Moths. The genus *Clisiocampa*, to which the Lackey Moth belongs, is characterised by having the male antennæ pectinated, and the female ciliated, and the abdomen of the female stout and pointed. All the members of this genus pupate in a cocoon spun amongst the food plant, the silk having mixed with it a quantity of yellow powder.

The Lackey Moth (*C. neustria*) is widely distributed over the south, west, and middle of England, but is by far more abundant and destructive in the south and west than in other parts. It does not occur further north than York, where it is usually rare. Always more or less prevalent in the south, at certain times it occurs in greater abundance, and apple and pear orchards are sometimes stripped of every vestige of foliage by the caterpillars. It is more abundant in France than elsewhere; and there are French laws compelling growers to cut off and destroy the "tents" formed by the larvæ. Guérin Méneville states that it is one of the most injurious fruit and forest pests in France. Kollar gives an account of it, and says that it is troublesome in Germany.

The moth is very variable in colour and size, and measures about an inch in expanse of wings in the male, and an inch and a half in the female. The fore wings are a rusty reddish-brown, yellowish-brown, ochreous or brick-dust red, with two pale or dusky-brown transverse lines across them, the space between the two bars being often more deeply coloured than the rest of the wing; the hind wings are the same tint as the fore, but often a little paler; the thorax and abdomen are densely scaly. The adult may be taken on the wing at dusk in July and August, and even as late as September.

The eggs are deposited by the female in rings on the smaller shoots of the fruit trees, each band containing from forty to over two hundred eggs. These bands remain on the trees all the winter. When the wood shrinks they can be turned round and round with ease. Being greyish-brown in colour, the ova are readily seen on the dark ground

colour of the twigs, and are thus well-known objects in an orchard.

About the end of April they hatch. The young larvæ are almost black at first, and more or less hairy. Very soon after they commence to form a fine web, enclosing a few leaves, and beneath this little tent of silk they continue to feed for some time. As they grow the silken house is enlarged, until in some large colonies it may reach nearly a foot in length. At first the larvæ feed entirely under the tent, but as they grow they spread out over the trees, and feed off the leafage and blossom, returning to the web at night and in wet weather. They become brilliantly coloured as they grow, being bluish-grey, with two black spots on the segment next the head, and two also on the bluish-grey head; three orange-red stripes run along each side, and between the two lowest of these is a broad blue stripe with little black specks, these brilliant lines being separated by black and black spotted with blue, and a white stripe down the back with a narrow black line on each side; the whole larva is covered with rather rusty hairs, darker above than at the sides. When full-grown it reaches an inch and a half in length. On warm days they may often be found in batches, several lying parallel with one another, either on the outside of the tent or along the branches. They are somewhat timid, and fall to the ground on the tree being shaken, but soon crawl back to the foliage again. They are said to lower themselves by a silken thread, but this is not certain. From the middle of June to the end of July the caterpillars reach maturity, and spin a delicate loose white cocoon, the silk being mixed with a yellowish powder and numerous hairs of the larvæ. These cases are formed amongst the leaves, on the bark, amongst grass below the trees, on walls, fences, etc., always above ground. In this cocoon the larva changes to a dark brown pupa, from which the moth hatches out in from two to three weeks.

The "Lackey" larvæ feed also on oak, elm, hawthorn, and many other trees and shrubs.

Closely-related species, which work in a similar way, are found amongst fruit and forest trees in North America.

O

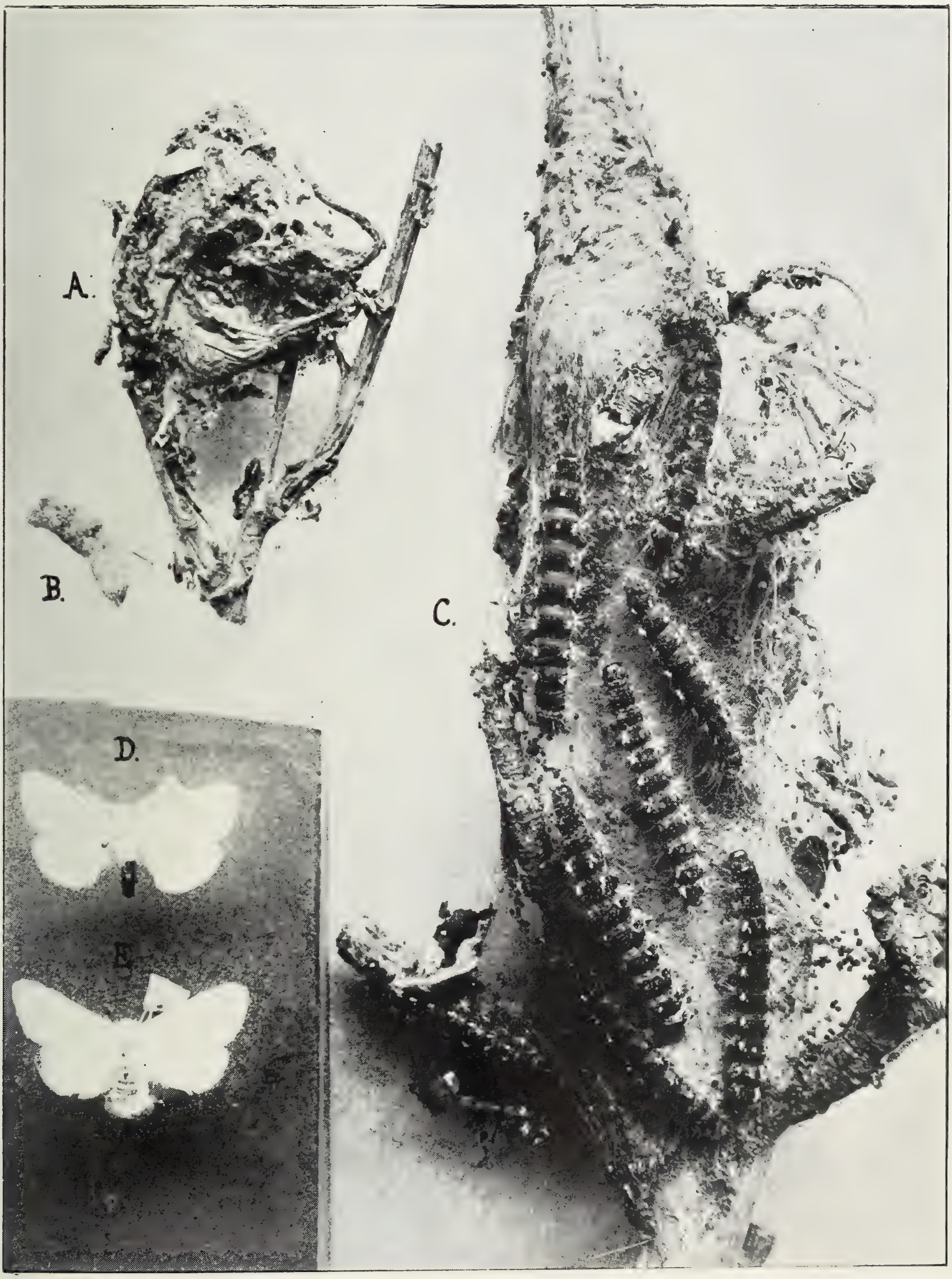
Especially to be noticed are the Apple-tree Tent Caterpillar (*C. Americana*, Harris) and the Forest Tent Caterpillar (*C. sylvatica*, Harris).

II.—THE BROWN-TAIL MOTH (*Porthesia chrysorrhœa*, Linn.).

According to Stainton, the Brown-Tail Moth is local, and not to be found everywhere. Where it does occur, however, it is often very abundant. It is recorded from Lytham, Epping, Teignmouth, Lewes, Lymington, Tenterden, Ramsgate, Stowmarket, Black Park, Chesham, Deal, Dorking, Newhaven, Bisterne, Bristol, Norwich, Canterbury, and many other places. It has been very abundant this year in Kent, and has done quite as much, if not more, harm in the orchards than the Lackey Moth. It is always more or less abundant in various parts of the country. The Brown-Tail belongs to the family *Liparidæ*, in which the male antennæ are pectinated, and the abdomen of the female thickened by a dense tuft of hairs at the apex. Larvæ and pupæ are both rather hairy; the former have sixteen legs, and may have tufts of hairs and two fleshy processes on the 11th and 12th segments. The Brown-Tail moth appears towards the end of July and in August. The female has pure white fore wings, with a faint black spot, the hind wings being pure white. The male has similar fore and hind wings, white head, thorax, and abdomen, the apex of the latter having a dark golden brown tuft. In length the wing expanse varies between an inch and a-quarter and an inch and three-quarters. It is a night flyer, resting during the day on walls, leaves, lamps, etc., and is then very sluggish, falling down as if dead when its resting-place is shaken.

The female lays her eggs on the under surface of the leaves of the oak, elm, black and white thorn, apple, plum, and sometimes pear. Each long patch of eggs is covered over by hair from the female's tail and the eggs completely hidden; the ova are round, of a dull golden hue, and as many as two hundred and fifty may be counted in each batch.

The larvæ hatch out from the beginning of August, and live through the winter. At first they are very small, of a



THE BROWN TAIL MOTH (*Porthesia chrysorrhœa*).

(A) Winter tent of larvæ. (B) Egg mass. (C) Summer tent and caterpillars. (D) Male, (E) female moth.

dirty yellow appearance, with a black head and four rows of black dots and numerous hairs. They at once spin a single leaf together, eating only the epidermis, and attaching the leaf by silk to the twig so that it cannot fall off.

Towards September they commence to make a regular tent or nest, attaching a number of leaves together by silk. The leaves are lined and covered with silk, and all firmly united. This nest is used as a place of protection from cold and damp, and as a nocturnal residence, just as in the case of the Lackey Moth. During the latter part of August or in September the larvæ moult, and still feed on as long as the leaves contain any sap. Even after the leaves have fallen it is not unusual to see the larvæ on a warm sunny day basking in the sun outside the tent. As the weather becomes cold they become dormant, and remain in their dwelling. The hardest frosts do not seem to harm them. In the spring they commence to feed on the leaves as they open, the larvæ wandering freely over the trees. Very frequently the colony divides, two nests being made, and sometimes even a third is formed. Early in May they moult again, and assume a deep brown appearance, with reddish-brown hairs, a row of white spots on each side, a narrow double broken line of red alone on the dorsum, black between, and with two prominent bright red tubercles on the back of the eleventh and twelfth segments, depressed in the centre; these tubercles can be elevated or depressed by the larvæ at will. After this last moult they spread out over the fruit trees, forsaking their nests, and then devour the leafage very ravenously.

From the end of June to the beginning of July they spin a cocoon amongst the leaves of fruit trees, as a rule several together forming a large mass united by a dusky web. In this they change to deep brown pupæ. Kollar says as many as twelve may be gathered in one ball; as many as forty have been counted on a damson tree. From these pupæ the moths hatch out in the latter part of July and August, and soon commence to lay fresh eggs on the trees.

Natural Enemies.—Kollar records that both the eggs and the larvæ of *P. chrysorrhœa* are attacked by Ichneumon Flies.

This has not been observed in Britain. Both these larvæ being hairy are avoided by birds, so that little help is given by birds in the orchard when these pests are causing the harm. The cuckoo is the only bird known to devour these hairy caterpillars. Kollar also mentions two beetles as destroying the larvæ of *C. neustria* on the Continent, namely, *Calosoma sycophanta* and *C. inquisitor*.

Prevention and Treatment.

After an attack of Lackey Moth larvæ the orchards should be inspected in the winter and all egg-bands collected and burnt. Of course on large trees this is not possible, but where it can be done it is a rule that should always be followed.

The small tents of the Brown-Tail should also be looked for during the winter and cut off and burnt. Any tents left should also be collected and destroyed in the early summer, either on a dull wet day or in the evening, that is, when the caterpillars are at home, or no good would be done. As the larvæ readily fall when shaken, care should be taken to hold boards or a sheet beneath the tent when it is being cut off, otherwise little good will accrue, as the larvæ soon get back to the trees.

A great deal of damage will be saved by spraying as soon as the attack is noticed, especially when the tents cannot be reached. For this purpose arsenical washes should be used. Of these washes the three best known are Paris green, London purple, and arsenate of lead. The latter is the best wash of the three, killing the larvæ and yet not damaging the leafage, as sometimes happens with Paris green.

Paris Green Wash is made as follows:—Add ½ lb. Paris green to 100 gallons of water, and mix up 1 lb. of lime with the same. This must be kept well stirred. Paris green can be used where poultry and stock are kept, the quantity applied to the trees being so small that it will have no effect upon animals.

London Purple is prepared in the same way as the above, the lime being again essential.

Arsenate of Lead is prepared as follows:—Dissolve 1 oz. of arsenate of soda in warm water, and add to 16 gallons of soft water. Then dissolve 3 oz. of acetate of lead in water, and pour into the 16 gallons of liquid. Add to this 2 lbs. of treacle. In the place of treacle the arsenate of lead wash may be mixed with paraffin emulsion, and so a double insecticide prepared. This wash when properly mixed is most successful, and never burns the leafage as growers often find to be the case with Paris green.

In all cases proper sprayers must be used with fine nozzles, so that a dense mist of the wash may be thrown on the trees.

EXPORTS OF PURE-BRED SHEEP FROM THE UNITED KINGDOM.

The export trade in pure-bred sheep from the United Kingdom commenced probably as long ago as the earliest settlements in America, but it is within the past thirty or forty years that it has attained importance as a branch of British husbandry. During that period it has been subject to considerable fluctuations.

There are, unfortunately, no precise figures available showing the number of sheep exported for breeding purposes as distinguished from those exported for slaughter. The numbers shown in the Board of Trade returns include a certain proportion of the latter class, mostly sent to Ascension and the Channel Islands. It would appear that from 700 to 800 may represent the number of "butcher's" sheep which are now annually exported.

The total number of sheep exported rose from an annual average of 2,818 in 1876-80 to 8,765 in 1896-1900. During the former period the average value per head ranged from £5 18s. in 1879 to £9 6s. in 1878, while in the latter period it varied from £10 6s. to £12 5s.

While these figures clearly indicate that exporters of sheep have had some cause for congratulation in recent years, it must be recognised that the years 1896-7-8 were characterised by a "boom" in the Argentine trade which, for the time being, stimulated demand and inflated prices. During these three years over 22,000 sheep (out of a total of 31,000 exported) were sent to Argentina alone at an average value per head of nearly £14.

In October, 1900, the trade with Argentina was stopped by the Government of that country, and the total exports of sheep fell, partly no doubt in consequence of this fact, from 7,586 in 1899, to 4,934 in 1900. But it may be pointed out

that the Argentine trade had already shown unmistakable signs of a reaction from the "boom" of 1896-8. Thus the number exported to that country fell from the maximum of 8,237 in 1897 to 6,632 in 1898, and again to 3,904 in 1899.

The following is a complete statement of the number and value of sheep exported to each foreign country or British possession in the year 1900:—

Countries to which exported.	1900. No.	1900. Value.	Value per head. £	Value per head. s.
		£.	£	s.
Russia	95	638	6	14
Sweden	4	43	10	15
Germany	592	5,299	8	19
Holland	3	16	5	7
France	118	516	4	7
U. S. of America	220	1,302	5	18
Chile	150	1,602	10	14
Brazil	8	114	14	5
Uruguay	146	3,331	22	16
Argentine Republic	1,991	31,534	15	17
Other Foreign Countries	36	330	9	3
Channel Islands	97	220	2	5
Ascension	600	1,660	2	15
Cape of Good Hope	58	606	10	9
Natal	5	50	10	0
British East Indies	12	80	6	13
Australia	62	1,278	20	12
New Zealand	26	928	35	14
Canada	703	3,706	5	5
British West India Islands	2	10	5	0
Falkland Islands	6	43	7	3
Other British Possessions	—	—	—	—
	4,934	53,306	10	16

Setting aside the Channel Islands and Ascension, as not affecting the trade in breeding sheep, it appears that the chief customers, now that the Argentine demand is suspended, are Canada and Germany. The United States, which stands next in 1900, took as many as 620 in 1899. The Canadian demand show signs of vitality at present, but the trade with both the Dominion and the United States fluctuates very much from year to year. There can, however, be little doubt that the sheep-breeding industry is a progressive one on the North American Continent, and competent observers are of opinion that the demand there for "stud" sheep

from this country is likely to be maintained for some years at least at its present, or even possibly at a higher, level. It is not, however, in the main, a trade in highly-priced animals. Germany has been a consistent purchaser of British sheep for the last thirty years, the trade having reached its maximum in 1883, when 2,937 were imported from the United Kingdom. Since that time, however, the flocks of Germany have dwindled to one-half, and it would be rash to assume that any expansion of the trade with that country is probable. Within the past few years an active demand has arisen from Uruguay, and the comparatively high prices paid for sheep sent there in 1900 indicate the enterprise of buyers. Still more recently Chili has become a purchaser, and both these countries—the former particularly—may for some time take a number of British sheep annually. The demand from Australia and New Zealand is intermittent and uncertain, but if statements which have lately appeared in Australasian papers as to the increased sheep-carrying capacity of the North Island of New Zealand are well founded, some impetus may probably be given for a time to the trade with that colony. The future demand for sheep from South Africa is obviously a matter of speculation, more especially as no statistics of the sheep stock before the war are available except as regards Cape Colony and Natal. In 1897 289 sheep were sent to Cape Colony, and, in 1898, 207 were sent to Natal. There seems reason to hope that with the settlement of South Africa the market there for British pedigree sheep may be revived, and, perhaps, largely extended.

There does not appear to be any indication of an increased demand for British sheep in the immediate future from any European country, unless, it may be, from Russia. During the past three years 262 have been sent to that country, the demand having been most active in 1898, the greater number having been sent to the northern ports of Russia; and it is known that specimens of various breeds have been purchased by the Russian Government for purposes of experiment or demonstration in connection with educational establishments.

SALE OF MILK REGULATIONS.

The Board of Agriculture, in exercise of the powers conferred on them by Section 4 of the Sale of Food and Drugs Act, 1899, have made the following regulations with respect to the sale of milk in Great Britain :—

Milk.

1. Where a sample of milk (not being milk sold as skimmed, or separated, or condensed, milk) contains less than 3 per cent. of milk-fat, it shall be presumed for the purposes of the Sale of Food and Drugs Act, 1875 to 1899, until the contrary is proved, that the milk is not genuine, by reason of the abstraction therefrom of milk-fat, or the addition thereto of water.

2. Where a sample of milk (not being milk sold as skimmed, or separated, or condensed, milk) contains less than 8·5 per cent. of milk-solids other than milk-fat, it shall be presumed for the purposes of the Sale of Food and Drugs Acts, 1875 to 1899, until the contrary is proved, that the milk is not genuine, by reason of the abstraction therefrom of milk-solids other than milk-fat, or the addition thereto of water.

Skimmed or Separated Milk.

3. Where a sample of skimmed or separated milk (not being condensed milk) contains less than 9 per cent. of milk-solids, it shall be presumed for the purposes of the Sale of Food and Drugs Acts, 1875 to 1899, until the contrary is proved, that the milk is not genuine, by reason of the abstraction therefrom of milk-solids other than milk-fat, or the addition thereto of water.

These regulations came into force on September 1st, 1901.

AGRICULTURAL AND MISCELLANEOUS NOTES.

Manuring of Seeds Hay.

An experiment on the manuring of seeds hay was carried out last year at eleven centres in the County of Durham, under the direction of the Agricultural Department of the Durham College of Science. A heavy crop of hay is an especially important consideration in this county on account of the demand created by the collieries, and the sale of hay being very common, the crop pays for a more liberal use of manure than if it were grown for consumption on the farm. The object of the experiment was to ascertain the effect of applications of nitrate of soda, sulphate of ammonia, superphosphate and kainit, either alone or as ingredients of a mixed manure for top-dressing first year seeds.

For the purpose of the experiment, an acre of land was divided into fifteen equal plots, the first five of which were treated as follows:—Plot 1, no manure; plot 2, 1½ cwt. sulphate of ammonia per acre; plot 3, 2 cwt. of nitrate of soda per acre; plot 4, ¾ cwt. of sulphate of ammonia and 1 cwt. of nitrate of soda per acre; and plot 5, half the dressing of plot 4. The second set of five plots received the same dressings as those already described, with the addition of 4 cwt. of kainit per acre; while the remaining five plots received the manures applied to the other two sets, in combination with 4 cwt. of superphosphate per acre, so that on this series plots 1 to 5 received a complete manure. The manures were applied early in April, with the exception of the nitrate of soda, which was put on at the beginning of May when the grass began to grow. The application of the superphosphate and

kainit was somewhat delayed owing to the high winds which prevailed at the end of March and the beginning of April.

Consistent results were obtained at six of the centres, and the effects of the manures on the weight of the hay crop were as follows:—Nitrate of soda proved more generally useful than sulphate of ammonia; kainit was unprofitable, it increased the yield on one farm only, and then it did not pay; superphosphate caused a profitable increase on two farms only; the most profitable manure consisted of 1 cwt. of nitrate of soda and ¾ cwt. sulphate of ammonia, but 2 cwt. of nitrate of soda did almost as well.

In connection with this experiment, it is observed that heavy dressings of nitrogenous manure must be used with caution, since they may appear to be profitable without actually being beneficial, as they may injure the clover crop. This point was illustrated in an experiment on seeds hay conducted at the Demonstration Farm at Cockle Park. With a complete manure there was 47 per cent. of clover in the hay, but when the nitrate of soda was omitted the percentage of clover rose to 73, and when slag was omitted it fell to 30. It would seem, therefore, that heavy top-dressings of nitrate of soda may smother out the clovers by stimulating the grasses, but that appropriate manuring with phosphates and potash may, by strengthening the clovers, preserve the balance of the mixture.

ARTIFICIAL MANURES FOR POTATOES.

Amongst the experiments carried out during the past year under the direction of the Agricultural Department of the University College of Wales, Aberystwyth, was one designed to demonstrate the relative importance of the different manurial elements for a potato crop raised without farmyard manure on Welsh farms. The experiment was carried out successfully on fifteen farms in different localities, and at each centre the land employed for the test was divided into four plots, each consisting of four rows, twenty-two yards long. The plots were manured respectively with (1) superphosphate;

(2) superphosphate and nitrate of soda; (3) superphosphate, nitrate of soda, and kainit; (4) superphosphate and kainit; all the manures being applied in the drills at the time of planting. The superphosphate was used at the rate of 6 cwts. per acre, while 2 cwts. of nitrate of soda and $3\frac{1}{2}$ cwts. of kainit were applied per acre. In some cases the crop from a portion of land on the dunged part of the field, equivalent in area to the experiment plot, was weighed for comparison, while in other cases the results were estimated by general observation. The total and average yield of potatoes each plot was as follows:—

	Plot 1. Superphosphate alone.	Plot 2. Superphosphate and Nitrate of Soda.	Plot 3. Superphosphate, Nitrate of Soda, and Kainit.	Plot 4. Superphosphate and Kainit.
	lbs.	lbs.	lbs.	lbs.
Total yield of 15 plots	2298	2832	3258	2878
Lowest and highest yield per plot	98-269	102-279	126-320	110-273
Average yield per plot	153	189	217	192

As superphosphate was used on all the plots, the results serve to indicate the effects of the addition of nitrate of soda and kainit separately and in combination. It will be noticed that the average yield on the plots which received nitrate of soda and kainit exceeded that obtained from the plot dressed with superphosphate alone. On plot 3, which received both kainit and nitrate of soda in addition to superphosphate, the increase on the average yield on plot 1 was 64 lbs. per plot, while on plots 2 (superphosphate and nitrate of soda) and 4 (superphosphate and kainit) the increase amounted to 36 lbs. and 39 lbs. per plot respectively. Calculated to the acre the increments on plots 2 and 4 amount to approximately 18 cwts. per acre in each case over plot 1, and on plot 3 the increase was over a ton and a-half per acre. These quantities are regarded as good returns for the manures applied, and particular attention is directed to the fact that the profit arising from the use of the three manures together on plot 3 was considerably greater than that obtained on the plots from which one or more of the manures was omitted.

Basic Slag for Meadow Hay.

During the past few years a number of experiments in the manuring of meadow or old land hay has been conducted in all parts of the North of England from the east coast of Durham to the west coast of Cumberland. These experiments, which have been conducted under the direction of the Durham College of Science, have shown that so far as the North of England is concerned, land devoted to the growth of hay may be divided into two classes, viz., land that is not, and land that is, greatly benefited by the action of basic slag.

On land of the former class the experiments have indicated that complex manures (*i.e.*, manures in which the nitrogen, phosphates, and potash are each or all supplied from two or more distinct sources) should be used, and that they should be applied frequently. Where the land is markedly improved by slag it has been found advantageous to apply large (7 to 10 cwts. per acre) and occasional dressings of this manure either by itself or with a potash manure. But if slag is to prove markedly beneficial the conditions must be such as to favour the growth of clover, for slag improves land largely through the agency of clover. On this point Professor Middleton remarks: "This manure has a direct and an indirect effect on the pasture. Like superphosphate and dissolved bones, it supplies phosphates, and phosphates benefit the majority of the plants that make up a hay crop; but to a greater extent than any other phosphatic manure slag stimulates the growth of the clovers, and the advantage of using this substance on its own peculiar soil is due to the fact that it enables white clover to cover the ground before the grasses become strong enough to dispute the surface with it. In the 'battle of the meadow' white clover is not a strong fighter, but when suitably aided it strikes quickly. It is when slag enables clover to obtain a temporary mastery that it becomes of peculiar value as a manure."

In cases where slag fails to improve poor grass land on which it might be expected to work well, experiments have shown that the failure is usually due to the soil being naturally deficient in potash, and before using slag it is therefore

advisable to ascertain whether the land also requires potash manures. For soils which are benefited by slag and are deficient in potash it is recommended that kainit or muriate of potash should be applied in the spring after the slag has been used, or a dressing of dung may be given; though for poor soils the artificial manure is likely to prove more profitable. On the poorest class of "slag" soils it is well to avoid dung at first, and to apply it two or three seasons after the slag; it is apt to stimulate coarse grasses to the detriment of the clovers, and, moreover, it will seldom pay to use dung for this class of soil if superior grass or tillage land is available upon which it may be used.

ENGLISH AND CANADIAN CLOVER SEED.

The report of the Agricultural Department of Reading College on the field trials conducted in 1900 contains an account of some observations made at Burghfield on the relative merits of English and Canadian clover seed. Clover seed was sown in a field in 1897, and on the greater part of the field English seed was sown, but a strip through the middle, $2\frac{3}{4}$ acres in area, was sown with Canadian seed. When the clover was cut for hay in 1898 the quantity carried from the land sown with English seed was at the rate of $1\frac{1}{2}$ tons per acre, while the portion sown with Canadian seed yielded only half a ton per acre. The second growth was kept for seed, of which one acre of the English clover yielded as much as the $2\frac{3}{4}$ acres of Canadian clover. In the following year, 1899, wheat was grown on the field, followed by barley in 1900. When the barley was cut it was noticed that there was an exceedingly good plant of clover, coming from the seed which had fallen in 1898, this had been ploughed in when the land was prepared for wheat, but had been brought near the surface when the barley was sown. As the clover plant was so good, it was left for a crop in 1901. Before the clover was cut the crop was inspected by several agriculturists on June 12th this year, and the same difference was observable.

The crop of clover on the part sown with English seed was rather more than an average for the season, but where the Canadian seed was sown there was very considerably less, the difference being from 15 to 18 cwt. of green herbage. The Canadian plants were not so strong in growth nor so thick, and there was a larger proportion of stem to leaves. The Canadian clover also differed from the English in not being so strong in growth, and the stems were considerably more hairy, while, although at first it seemed to be more backward, it came into flower and matured more quickly than the English clover.

CHARLOCK SPRAYING.

At the farm of the Midland Agricultural and Dairy Institute, Kingston, experiments have been carried out with solutions of the sulphates of iron and copper of various strengths to determine their action in killing or preventing the seeding of charlock.

Barley and oats were sprayed either with sulphate of iron (green vitriol) 5 per cent. and 7 per cent. solutions, at the rate of 40 gallons per acre, or with sulphate of copper (blue vitriol) 2 per cent. solution, at the rate of 25 and 40 gallons per acre.

The conclusions drawn from the results are that a 5 per cent. solution of sulphate of iron is as good as a 7 per cent. solution of the same material, when both are applied at the rate of 40 gallons per acre, but that a 3 per cent. solution of copper sulphate is as good as a 5 per cent. or a 7 per cent. solution of sulphate of iron, if each is applied at the rate of 40 gallons per acre.

A 40 gallon dressing of a 3 per cent. solution of sulphate of copper per acre was better than a 25 gallon dressing of the same strength.

It was found that sulphate of copper tended to cause young oat plants to flag more than the sulphate of iron did, while sulphate of iron caused more flagging in barley than in oats.

From these experiments it is held that the best strength of

solution is 12 lbs. of copper sulphate in 40 lbs. of water per acre. A dry time should be chosen, and if rain comes soon after spraying, the operation should be repeated.

KILN DUST AS A MANURE FOR POTATOES.

Some experiments on the manuring of potatoes have been carried out during the past two years at Blidworth, under the direction of the staff of the Midland Agricultural and Dairy Institute.

These experiments were carried out on a farm and on a piece of allotment ground where potatoes are grown very frequently year after year.

An interesting feature of these trials has been the results obtained by the application of dressings of kiln dust as compared with those from dressings of farmyard manure and from ordinary mineral artificial manures.

On the farm the average results of the two years' experiments furnished the following net profits per acre (debiting the whole cost of the manure to the potato crop) from the three most profitable dressings.

	£	s.	d.
From 1 ton of kiln dust - - - - - - - -	2	15	8
From ½ ton of kiln dust - - - - - - - -	3	15	4
From complete dressing of 3⅓ cwts. kainit, 1⅝ cwts. nitrate of soda, and 2½ cwts. superphosphate - -	2	17	6

On the allotments, kiln dust also yielded the greatest profit, and the complete dressing of artificials ranked next as was the case on the farm plots.

CABBAGE-ROOT FLY (*Phorbia brassicæ*).

This fly is a great pest in most cabbage growing districts in Great Britain, and also causes much harm in North America. The chief authority on this insect is Professor

Slingerland,* who has conducted a long series of experiments with a view to reducing the damage caused by it.

The fly, which is very like the house fly, appears in successive broods all through the summer; generally there are three broods in Great Britain. Maggots may be found as late as November; these latter pupate in the soil, but it would appear that some of the mature flies also hibernate, and emerge to lay eggs in the spring. The greater number, however, undoubtedly pass the winter in the pupal stage, either in the ground or in the heaps of cabbage stumps and roots often to be seen on a farm.

The results obtained by Professor Slingerland indicate that only two things can be done to mitigate the evil caused by the "root maggot." As a preventive the only effective device is to apply around each plant, when it is set, a tarred disc of card-board. These can be cut out by machinery in large numbers, and as placing them around each plant before it is set takes little time, the plan has been adopted on a large scale by some American growers.

The only other plan found serviceable is the use of bisulphide of carbon or carbolic acid; the former being injected into the ground. This treatment on a large scale would be costly in Great Britain.

In all cases reported, great benefit has been derived by dressing the land after a crop of cabbage or kindred plants with gas-lime during the winter, to destroy the puparia in the soil. A dressing of superphosphate of lime has been found beneficial on the Continent. Broad-casting soot and lime around the plants soon after planting out has also been successful in preventing the flies from laying eggs, but it is by no means certain in action.

All cabbage stumps and other roots after an attack should be burnt.

* *Cornell University Experiment Station, Bulletin* 78. *Nov.* 1894.

THE LARDER BEETLE.

The Larder Beetle (*Dermestes lardarius*) is common to North America, Europe, and Asia. It attacks not only bacon

and hams, but cheese, horn, skins, feathers, hair, silk, and other dry goods. Fresh hams and bacon are not so liable to be attacked as those that are slightly tainted, improperly cured, or injured in any way.

The beetles are very disposed to lay their eggs in any crevice. The larvæ are very minute when first hatched, and can easily penetrate muslin (in which bacon is frequently hung) unless it is very fine. The larvæ as they mature bury themselves in the bacon, although at first they feed upon the exterior.

To prevent their attack, bacon is best hung as it sometimes is in America, in thin paper bags, care being taken that all crevices are closed, or else the minute larvæ coming from the eggs laid on the paper may manage to work their way through.

When the larvæ and beetles are found on the bacon, the attacked part should be cut away fairly deeply, and well washed with a strong solution of salicylate of soda or salicylic acid. After a bad attack, the store-room should be well whitewashed and then fumigated with bisulphide of carbon or with sulphur; the former is much the most successful way of clearing out indoor pests in store-rooms. It may be noted, however, that the bisulphide of carbon, although very effectual against the larvæ, pupæ, and mature beetles, does not appear to have any influence on the eggs, whereas salicylic acid appears to destroy delicate eggs.

THE FRIT FLY.

Considerable damage has been caused this year to barley and oats in many districts, particularly in the South of England, by a small dipterous insect known as the Frit Fly, which is either *Oscinis frit* (Linn.) or *Oscinis vastator* (Curtis). If these two species are really distinct they nevertheless have a similar life-history.

The larvæ of the first brood are noticed in the spring feeding just inside the crown of the plant, and in the majority

of cases they destroy it. The central leaves of the plant die off, and become yellow and brown, and by degrees the entire plant withers away. When, however, the larvæ feed between the outer leaves, as seems often to be the case, the plant may survive. Crops that sometimes look irreparably damaged often tiller out and produce a moderate yield.

The larvæ, after turning into pupæ, hatch out into flies about June or July. Both larvæ and pupæ are characterised by having curious branched external spiracles near the head. These flies give rise to a second brood upon the corn, the eggs being probably laid upon the developing grain. In Sweden this second attack is often harmful, producing light, shrivelled samples of corn ("frits").

Little or nothing can be done when a crop is badly attacked. One feature has been noticed in districts where the frit fly is abundant, namely, that early sown crops suffer the least. Some oats sown on the 29th March were not attacked, while others sown on the 29th April had over seventy per cent. of the stems attacked. Early sowing of oats has therefore been strongly recommended, and when the attack is first noticed the loss may often be materially lessened by giving a good dressing of soot and nitrate of soda. Where a field is severely damaged it is as well to plough it up deeply at once, so as to bury the pupæ of the flies and thus prevent the appearance of the second or summer brood, which cannot easily be destroyed.

There is a possibility of this species being spread with the seed. The small yellowish brown puparia (pupa-cases) may get harvested with the oats or barley, and seed corn should therefore be examined and rejected if there are any signs of the puparia.

SHEEP WORRYING.

The Board of Agriculture have issued the following circular to Clerks to County Councils in Great Britain on the subject of sheep-worrying by dogs:—

SIR, 29th July, 1901.

I am directed by the President of the Board of Agriculture to inform you that he has for some time past had under his consideration the representations made

to him by various County Councils, more particularly in Scotland, on the subject of the worrying of sheep by dogs.

There can be no doubt that the damage and loss sustained in this way by agriculturists is in many districts very considerable, but it is not an easy matter to devise remedies which would be practical and efficient.

The suggestions which have been most frequently made on the subject are that County Councils should be empowered to require that dogs should wear collars inscribed with the name and address of their owners, that better provision should be made for the seizure of stray dogs, that the County Councils should also be empowered to make bye-laws for preventing dogs from straying between sunset and sunrise, and that the consent of a Petty Sessional Court, or—in Scotland—of the Sheriff, should be necessary as a condition precedent to the issue of a Certificate of Exemption from Licence Duty.

Proposals for legislation on the subject were embodied in the Dogs Regulation Bill introduced into the House of Commons by Mr. Long, when President of the Board, in 1900, and Mr. Hanbury had hoped to deal with the matter during the present Session of Parliament. There is now no possibility that this will be the case, but he thinks that it is desirable that he should direct the attention of County Councils to existing powers for the enforcement of the Dog Licence Duties, and the seizure of stray dogs.

Under Section 23 of the Customs and Inland Revenue Act, 1878, the police may sue for and recover penalties for the keeping of dogs without a licence, and the Court has power to award costs; and one half of the penalty in England and Wales is payable for the benefit of the Superannuation Fund of the police force to which the police constable who instituted the prosecution belonged, and in Scotland to the treasurer of the police assessment of the county or burgh to the police force of which such police constable belonged.

Under Article 10 of the Rabies Order of 1897, Local Authorities are required, irrespective of any question of the freedom of their district from rabies, to cause all stray dogs found within their district to be seized and dealt with as therein provided. This Order is one which may with considerable advantage be enforced by the police acting in co-operation with the Local Authority.

Mr. Hanbury believes that if arrangements could be made for the exercise of these powers and duties by the police with vigilance and efficiency, the evils of which agriculturists complain might be materially reduced, and he therefore desires me to ask you to bring the matter under the notice of your Council with a view to their considering whether further action might not be taken with advantage in the directions indicated.

I enclose additional copies of this Circular for distribution to the members of your Council, and also of the Circular $A\frac{74}{c.}$ issued by the Board on the subject in January, 1899, to which they desire to give further publicity at the present time.

I am, etc.,

T. H. ELLIOTT,

Secretary.

Circular $A\frac{74}{c.}$ was issued to Local Authorities under the Diseases of Animals Acts, 1894 and 1896, other than those wholly within the Metropolitan Police District, and was as follows:—

SIR, 7th January, 1899.

I am directed by the Board of Agriculture to inform you that they are desirous of drawing the attention of your Local Authority to the Recommendations made by the Departmental Committee appointed in April, 1896, to inquire into and

report upon the working of the Laws relating to Dogs, [C. 8320], with regard especially to the seizure of stray dogs and the collection of the dog licence duties.

The Committee point out in their Report that the returns of the number of unclaimed dogs destroyed in districts where muzzling orders have been in force, or where the police have rigorously carried out their general powers of seizing stray dogs, "prove beyond doubt that the number of dogs, more especially in centres of population, has been allowed to become excessive, with the natural result that very many of them become stray or uncared for, and virtually ownerless dogs."

The finding of the Committee in this matter is fully corroborated by the experience of the Police Authorities in the large urban districts in recent years. In the Metropolitan Police District, the number of dogs seized during the past three years has been as follows :—

1895 - - - - - - -	34,147
1896 - - - - - - -	62,462
1897 - - - - - - -	45,756
	142,365

In Liverpool, the number seized during the same period has been 9,459 ; in Manchester and Salford, 10,678 ; in Nottingham, 6,072 ; in the County of Lancaster, 10,626 ; in Birmingham (1896 and 1897), 6,880 ; in Leeds, 7,365 ; and in Glasgow, 5,374.

It is evident from these figures that, apart from any question as to the annoyance and even danger which is attendant upon a large vagrant dog population, very great cruelty and suffering is occasioned where dogs are either cast upon the streets or are allowed, through indifference or neglect, to become homeless, and the Board are satisfied that any steps which can be taken for the prevention of these evils would be not only in the general interest of the public but would also promote the humane treatment of the animals themselves.

The Committee observe in their Report that "with the extirpation of rabies the necessity of muzzling will, in our opinion, have disappeared, but we consider it expedient that more efficient means than those which exist at present should be devised for the due licensing of dogs and for their subsequent regulation." They further express the opinion that "an effective system of licensing is clearly one of the most powerful checks that the law can impose upon an excessive or ill-regulated increase in the dog population," and they state that they have "received evidence which proves that the payment of dog-licence duties is largely evaded."

In these conclusions the Board entirely concur, and they would express the hope that your Local Authority will take the matter into their consideration at an early date with the view to the issue of such further instructions to the Police as may be necessary to secure full efficiency in regard to the seizure of stray dogs and the collection of the dog-licence duty.

I am to add that the Inland Revenue Department have issued instructions to their Collectors to furnish to the Police, on application, at the end of March in each year lists of licensed persons in such a form as to show readily whether a person is duly licensed or not, supplementary lists being supplied at the end of April, May, June, July, August, and September. As your local authority are aware, the Police possess full powers under Section 23 of the Customs and Inland Revenue Act, 1878, to take proceedings against persons for non-compliance with the provisions of that Act.

The Board believe that by the means above indicated very much could be done to secure that the dog population shall be both well-ordered and well cared for, a result which it is most important to secure both on sanitary and social grounds.

I am, etc.,

T. H. ELLIOTT,

Secretary.

FERTILISERS AND FEEDING STUFFS ACT, 1893.

The number of samples of fertilisers and of feeding stuffs analysed under the above Act in Great Britain in 1899 and 1900 is shown in the following table, which has been compiled from information furnished in the Annual Report of the Board of Agriculture on Proceedings under the Sale of Food and Drugs Acts and other Acts, for 1900. (Cd. 654).

——	Number of Samples of				Total Number of Samples Analysed.	
	Fertilisers Analysed.		Feeding Stuffs Analysed.			
	1899.	1900.	1899.	1900.	1899.	1900.
England - -	360	277	188	217	548	494
Wales - - -	51	65	13	64	64	129
Scotland - -	275	277	78	74	353	351
Total - -	686	619	279	355	965	974

ROYAL COMMISSION ON HORSE BREEDING.

In their eighth report* on Horse Breeding the Royal Commissioners state that the usual premiums were awarded at the two shows held in London in 1900 and 1901. The number of district stallions competing in the district classes remained practically stationary, but it appeared from the reports of the judges that the general quality of the recent exhibits was above the average, and many young horses likely to make valuable stallions in the future were reported to be coming on. The action of some of the horses which gained premiums at the last show was exceptionally good, and two of the winning horses were descended from premium

*Cd. 712. Price 2½d.

stallions. From the animals exhibited suitable horses have been selected and located in various districts of Great Britain.

The question of army remounts has constantly occupied the attention of the Commissioners. The war in South Africa has brought the matter more prominently forward, and has made the Commissioners aware of the deficiencies existing, and the necessity for some change in the present system. They are strongly of opinion that great benefit would accrue to the public service, and to the horse breeding industry of this country, if a system of purchase of remount horses between three and four years old were adopted by the Government.

The system of placing premium stallions within the reach of breeders is, the Commissioners observe, eminently calculated to augment the supply of half-bred horses throughout the country, but the sum voted by Parliament is not sufficient to enable them to enlarge their sphere of usefulness.

The 29 stallions receiving premiums served 1,433 mares in 1899, and 1,449 mares in 1900, at the Royal Commission's fee of 42s. 6d. each. In addition, 68 mares were served in 1899, and 97 in 1900 at the owner's fee. The average percentage of foals left by the 29 stallions in 1899 was 56.

The following are the conditions under which the shows for the King's Premiums were held in 1900 and 1901 :—

The shows are held in London in conjunction with the Hunters Improvement Society.

Twenty-nine equal premiums, consisting each of £150, are offered for thoroughbred stallions (between four years old and not exceeding twenty years) for England, Wales, and Scotland.

Each stallion winning a premium shall serve not less than fifty half-bred mares, if required, during the season, and shall stand or travel as the Commissioners may direct in the district for which he is exhibited, at a fee not exceeding 40s. for each mare and 2s. 6d. for the groom.

It shall be a condition that no Premium Stallion shall be allowed to be exhibited *for competition* during the season of service.

It shall be a condition that a stallion which has won four King's premiums in the same district class shall be ineligible for entry again in the same class, but shall be eligible for any other district class.

Stallions shall compete in the district class *only* for which they are entered, and exhibitors may not enter more than one stallion in each class.

The Commissioners reserve power to award to a stallion unsuccessful in the district class for which he is entered a premium in the class for any other district *provided* the exhibitor enters the stallion on these terms. Should a premium be awarded in such other class, the obligations as to location and service shall apply to the district for which the premium is awarded, instead of the district for which the stallion is exhibited.

The following diseases shall disqualify a thoroughbred stallion for the purposes of this Commission, viz.:—Roaring—whistling, ringbone, unsound feet, navicular disease, spavin, cataract.

If any stallion winning a premium should not serve at least thirty half-bred mares during the season, the Commissioners reserve the power to reduce the premium.

The season of service commences on April 2nd and terminates on July 31st.

BUTTER REGULATIONS COMMITTEE.

The Right Hon. R. W. Hanbury, M.P., President of the Board of Agriculture, and the Right Hon. H. C. Plunkett, Vice-President of the Department of Agriculture and other Industries and Technical Instruction for Ireland, have appointed a joint Departmental Committee to inquire and report as to what regulations, if any, may with advantage be made under Section 4 of the Sale of Food and Drugs Act, 1899, for determining what deficiency in any of the normal constituents of butter, or what addition of extraneous matter, or proportion of water in any sample of butter shall, for the purpose of the Sale of Food and Drugs Acts, raise a presumption, until the contrary is proved, that the butter is not genuine.

The committee consists of the following gentlemen, viz.:—Right Hon. Horace Curzon Plunkett (Chairman); Sir Charles Cameron, C.B., M.D., Medical Officer of Health and Public Analyst for Dublin; Professor Thomas Edward Thorpe, C.B., LL D., F.R.S., Principal Chemist of the Government Laboratories ; Major Patrick George Craigie, an Assistant-Secretary of the Board of Agriculture ; Mr. Robert Andrew Anderson, Secretary of the Irish Agricultural Organisation Society; Mr. Christopher Dunn, J.P., Chairman of the Trustees of the Cork Butter Market; Mr. George Gibbons ; Mr. John Gilchrist; Mr. Patrick Hickey; Mr. Hudson Ewbanke Kearley, M.P.; and Professor John Millar Thomson, LL.D., F.R.S., President of the Institute of Chemistry. Mr. Arthur Edwin Balleine, of the Board of Agriculture, acts as secretary to the committee.

The committee held sittings at the Board of Agriculture on July 30th and 31st and August 1st, when the following

witnesses gave evidence:—Mr. G. Lewin, Superintending Analyst at the Government Laboratory; Mr. R. Bannister, late Deputy Principal of the same Department; Mr. J. C. Lovell, representative of the London Chamber of Commerce; Mr. Harald Faber, Agricultural Commissioner to the Danish Government; Mr. E. Mathews, on behalf of the English Jersey Cattle Society; Miss Maidment, of the Dairy School of the Durham County Council; Mr. R. Drummond, of the Kilmarnock Dairy School; and representatives of Messrs. J. and J. Lonsdale (Liverpool), and of the Home and Colonial Stores.

SPRING AND SUMMER HIRINGS IN SCOTLAND.

The *Labour Gazette* for August last states that at the principal hiring fairs between the months of February and July this year the increase which took place in the spring and summer of 1900 in wages obtained by farm servants has been generally well maintained. In many cases there was a further rise, particularly in the case of women and of men having women workers in their families.

At the early spring hiring fairs in the Border counties and the Lothians, where the system largely prevails of families being engaged to work on the same farms, wages frequently had an upward tendency in the case of ploughmen who could provide women workers. The wages of ploughmen generally varied between 15s. and 20s. a-week, married men getting in addition various allowances in kind. The higher wages are mostly paid in the Lothians, but in these counties fewer allowances in kind are generally given than in the Border counties. Sons living with their parents are sometimes paid entirely in cash, and sometimes they get an allowance in potatoes and less money. Women workers usually receive from 9s. to 11s. a week, with extra money at harvest, and sometimes at potato lifting.

In other parts of Scotland at the half-yearly hirings, first horsemen as a rule got £16 to £20 for the half year, and other

horsemen £11 to £16, with the usual allowances in the case of married men, and board and lodging in the case of unmarried men. Women and lads got from £6 to £12.

ADULTERATION OF FOOD IN SCOTLAND.

The Local Government Board for Scotland, in their Annual Report for 1900, give an account of their action under the Sale of Food and Drugs Acts and of the various orders and circulars issued for the guidance of local authorities. During the year 1900 approval was given to the appointment of public analysts in seventeen counties and in 112 burghs, and other cases were under consideration. There were ten counties and 68 burghs in which no samples were sent to the analysts during the year; and it is observed that the total population of the districts in which the administration of the Act was neglected was 500,913, being 12 per cent. of the population of Scotland. With regard to the number of samples analysed the returns for the whole year were not available at the date of this Report, but for the nine months ending 30th September, 1900, the number of samples examined by public analysts on behalf of local authorities was 2,253, and on behalf of private persons 144. Of the former 325, or 14 per cent., and of the latter ten, or 7 per cent., were found to be adulterated. Prosecutions were instituted in respect of 148 of the 325 adulterated samples, and convictions were obtained in 89 cases, the penalties and costs imposed in 78 cases amounting to £256, or about £3 5s. 8d. for each conviction; 44 of the prosecutions were withdrawn, costs being allowed against the offenders.

The article most frequently sampled was milk, 1,137 samples being taken of this commodity, of which 180, or 15.8 per cent., were reported to be adulterated. The adulteration was mainly in respect of abstraction of fat or addition of water. Sometimes, however, the analysis showed that skim milk had been added to new milk, or that fat had been abstracted and water also added. In the case of butter, 350

samples were analysed, and 43, or 12.3 per cent., were reported to be adulterated. No fewer than 29 of the adulterated samples contained more than 70 per cent. of foreign fat. Five of them were reported as wholly margarine, 15 as containing from 90 to 98 per cent. of foreign fat, 5 from 80 to 90 per cent., and 4 from 70 to 80 per cent. Prosecutions were instituted in twenty-one cases and convictions obtained in sixteen.

Of the 52 samples of cheese examined two were reported to be adulterated. In one case there was gross adulteration, the sample containing only 15.5 per cent. of fat, and of that at least 90 per cent. was other than butter fat. Six samples of margarine were reported as adulterated on account of the presence of boric acid, but no prosecutions were made, though 12 prosecutions were instituted for not complying with the Margarine Act in regard to labelling. Jams and marmalade were examined in 35 cases, and 14 cases were reported adulterated with glucose, which was found to be present in proportions varying from 1 to 40 per cent. Of 20 samples of oatmeal and 18 of flour examined all were reported genuine.

[*Sixth Annual Report of the Local Government Board for Scotland.* *Cd. 701.*]

AGRICULTURE IN ORKNEY AND SHETLAND.

The Report by the Crofters' Commission to the Congested Districts Board for Scotland*contains some interesting information relating to the agricultural conditions of Orkney and Shetland. In Orkney the land is reported to have been judiciously laid out. There are large and medium sized farms in most of the islands, while in close proximity to them are crofts of various sizes. The people are hard-working and thrifty, skilful tillers of the soil, and good rearers of stock. Agriculture is carried on according to modern principles, and the stock raised is of a superior class. The cattle consist mainly of shorthorn and polled crosses. Horses of good

*[*Cd.* 553. 1901. *Price* 6½*d.*

size and quality are bred, and crofters, generally speaking, pay as much attention to the rearing of these as do the large farmers. The rearing of pigs and poultry is an important branch of Orcadian industry, and the income derived from these sources is very considerable.

In some districts a considerable revenue is derived from the kelp industry. This remark applies in particular to Stronsay, Westray, and Papa Westray. The securing of the weed and tangle and the drying and burning of the same involves a great amount of hard labour, and the return for it in cash would be considered, in the ordinary case, scarcely adequate, but here it is of value, as it affords employment to the tenant and his family during a period which would otherwise be unproductive.

There are no common pastures in Orkney, almost all the land in the islands (excluding the hills) being under cultivation, and much of the croft land has been reclaimed by the occupiers or their predecessors from the brake.

The agricultural conditions prevailing in Shetland are in every way different from those in Orkney. In the latter almost every available acre is under the plough ; in the former the arable land consists of small patches near the shore. This land is, as a rule, referred to as "merks." The merks were the proper udal lands, and were anciently free. Attached to each udal possession was an interest in the common grazing. This common land alone was liable to "scat" duty, and hence the term "scattald," or "scathold," by which the Shetland common pasture is known. The interest of the udal proprietor in the scattald depended on the number of merks he owned of arable land. In most cases the scattalds have been divided by decree of the Supreme Court, but it frequently happens that, for practical purposes, the division is only on paper, and that, as the different portions are unenclosed, the stocks of tenants of various owners graze promiscuously over the whole.

The arable land has been reclaimed from the moor and moss, and in many cases has been brought into a state of fertility ; fair crops of oats, chiefly grey oats, and bere are raised, and large crops of potatoes and cabbages. The

land is under continuous cultivation, and, in order to maintain a certain depth at places where the soil is washed away, earth is removed from the "scattald," or common grazing land, and spread over the thinner parts. This is highly beneficial to the arable land, but the process of scalping (as it is called) is detrimental to the scattalds, which are on the whole poor and bleak. Some of them are, however, capable of raising fair stock if they were only grazed more lightly. Over-stocking is very prevalent, and at present there are no adequate means of preventing it. The sheep kept are almost entirely of the native breed. These animals, on account of their small size, are of little value in the ordinary market, but their wool is of great importance in every Shetland home, the natural colours of the animals being very valuable in the preparation of Shetland hosiery, which is a very considerable source of income to the islands. The cattle kept by the crofters are of the small Shetland breed, the cows of which produce a fair quantity of milk of good quality, but, as is the case also with other kinds of live stock, little attention is paid to the breeding.

Shetland ponies are bred universally, and almost every crofter has a pony or two. It is by no means uncommon for a number of crofters and crofters' sons to subscribe a certain amount of money and invest the same in purchasing a pony, and it often happens that while a man can call no pony his own, he has shares in several. Another occupant of the Shetland scattald is the goose, most crofters having flocks of geese, which roam at large over the common pasture. Birds suitable for the market are sold in the autumn and sent to the south, where they are fed for the Christmas season.

NEW ZEALAND AGRICULTURE, 1885-1900.

The Registrar-General of New Zealand has published the details shown below respecting the utilisation of lands in the colony of New Zealand at five year intervals. It would appear that the area under grain in the colony has been fluctuating and non-progressive, and that the cultivation of

green and other crops, although it has increased in fifteen years by fully 70 per cent., is not very considerable. On the other hand the area under sown grasses, ploughed and unploughed, has increased by over 100 per cent., and attained a total not much short of 11,000,000 acres.

Area under Cultivation in New Zealand.

YEAR.	Total Area under Grain.	Total Area under Green and Other Crops.	Area under Sown Grasses.
	Acres.	Acres.	Acres.
1885 - - - - -	664,540	467,701	5,258,834
1890 - - - - -	826,505	513,893	6,525,049
1895 - - - - -	560,179	597,686	8,829,717
1900 - - - - -	745,685	796,773	10,853,302

The bulk of the cereals and other crops is found in the South Island, which had in 1900 as much as 661,000 acres under grain (or about 89 per cent. of the total), and 606,000 acres (or about 76 per cent.) under green and other crops. The bulk of the grazing land—just two-thirds—is, on the other hand, in the North Island; and it is there also that the greatest increase in the area under grasses has taken place. In 1885 the South Island had almost as much land under grasses as the North Island, viz., 2,504,000 as compared with 2,755,000 acres; but whereas the increase in the fifteen years has amounted to 70 per cent. only in the former, it has been over 140 per cent. in the latter.

By far the larger part of these grazing lands is occupied by sheep, and the following table shows that the flocks of the Colony as a whole showed a substantial increase until 1895, which must, however, be entirely credited to the North Island. The South Island indeed finishes in the year 1900 with a smaller total than it had in 1885, while the numbers in the North Island had more than doubled.

Number of Sheep in New Zealand.

Year.	North Island.	South Island.	Total.
1885	4,925,253	9,621,548	14,546,801
1890	6.588,346	9,527,767	16,116,113
1895	8,994,646	10,831,958	19,826,604
1900	9,998,173	9,357,022	19,355,195

The exports of the chief products of the pastoral industries of New Zealand are shown in the following table, in which the figures represent the total value of the commodities exported in quinquennial periods :—

Total Exports in Five Year Periods from New Zealand.

Period.	Wool.	Frozen Meat.	Butter and Cheese.	Grain.
	£	£	£	£
1881-85	15,515,327	*856,614	355,534	4,461,278
1886-90	17,636,027	3,382,854	879,479	3,591,827
1891-95	20,706,878	5,770,524	1,654,401	2,517,973
1896-1900.	22,554,619	8,729,860	3,187,684	2,473,759

* This export began in 1882.

The value of the wool exports has risen by over 45 per cent., while that of the shipments of frozen meat and dairy produce has increased, roughly, tenfold. The exports of grain have, according to these figures, on the other hand been on the down grade throughout the period under review.

There are several other items of minor importance connected with pastoral pursuits which furnish, in the aggregate, a substantial addition to the trade of New Zealand. Such are tallow, sheepskins, hides, meat (preserved, cured, and salted), sausage skins, and live stock. In the single year 1900 the exports of these products reached a total value of £889,653, against £471,246 in 1885.

[*New Zealand Trade Review, June* 13*th*, 1901.]

DECREASED COST OF FARMING IN THE UNITED STATES.

The United States Department of Agriculture have recently issued a bulletin (Misc. Series No. 18) dealing with the course of prices of farm implements and machinery for a series of years. The endeavour was made to obtain prices for 1860, 1880, 1890, 1895, and 1900. Agricultural implements and machinery have, of course, been immensely improved since 1860, and in many cases materially so since 1880 and even 1890; so that a comparison of prices for earlier years with

1900 does not fully represent the same implements and machines.

Tables are given showing the prices of the various implements at the above-mentioned dates, wherever practicable. No totals can be given, but certain conclusions may, nevertheless, be drawn. The most conspicuous feature is the enormous decline in the retail price from 1860 to 1895, in spite of the gain in efficiency, durability, lightness, and other improvements. From 1895 to 1900 there was reported from many establishments an increase in prices. This is considered to be partly abnormal, due to the depression prevailing about 1895 and the business revival about 1897.

Some indication of the contrast between farming as it was practised in America half a century ago and as it may be carried on now with the advantage of labour-saving machinery and with the aid of the implements, materials, and processes contributed by science, is also reproduced from a report on hand and machine labour issued by the United States Department of Labour in 1898.

As regards wheat cultivation and harvesting, the comparison relates to the years 1830 and 1896. The use of steam as a substitute for horse-power in ploughing, harvesting, and threshing wheat has not materially, it is stated, contributed to economy, except from a saving due to the elimination of animal power, so the more common power supplied by horses is selected for comparison. In the United States the amount of human labour now required to produce a bushel of wheat is, on an average, put at only ten minutes, whereas in 1830 the time was 3 hours 3 minutes. During this interval the cost of the human labour required to produce this bushel declined from about $8\frac{7}{8}$d. to $1\frac{2}{3}$d.

In the contrast thus presented, the heavy clumsy plough of the day was used in 1830; the seed was sown by hand and was harrowed into the ground by drawing bushes over it; the grain was cut with sickles, hauled to a barn, and sometime before the following spring was threshed with flails; the winnowing was done with a sheet attached to rods, on which the grain was placed with a shovel and then tossed up and down by two men until the wind had blown out the chaff. In

the later year, on the other hand, the ground was ploughed and pulverised in the same operation by a disc plough; the seed was sown with a mechanical seeder drawn by horses; the reaping, threshing, and sacking of the wheat were done with the combined reaper and thresher drawn by horses, and then the wheat was ready to haul to the granary.

It is estimated that the time of human labour required to produce 1 bushel of maize declined on the average from 4 hours 34 minutes to 41 minutes, and the cost of the human labour to produce the bushel fell from $17\frac{7}{8}$d. to $5\frac{1}{4}$d. One of the most striking changes is in the shelling of the maize, the machine operated by steam shells one bushel per minute, while in the old way the labour of one man was required for 100 minutes to do the same work.

When men, in 1860, mowed the grass with scythes, spread it and turned it over with pitchforks to dry, raked it into rows with a hand rake, cocked it with a pitchfork, and baled it with a hand press, the time of human labour required per ton was $35\frac{1}{2}$ hours; but when for this method there were substituted a mower, a haytedder, and a hayrake, gatherer, and stacker drawn by horse, the time was reduced to $11\frac{1}{2}$ hours in 1894; while the cost of human labour was reduced from 12s. 9d. to 5s. $4\frac{1}{2}$d. The more noticeable economy in hay-making is in the mowing and curing of the grass.

It should not be assumed, however, that all the machines mentioned have come into general use in the United States, or that the earlier implements have been altogether discarded. As a matter of fact the two-horse walking plough, the pitch-fork, etc., are still in general use in the fields, while the combined reaper and thresher, etc., have come into use only to a limited extent. The more complicated machines are mainly adapted to use in farming on a large scale under favourable circumstances.

HORSE BREEDING INDUSTRY IN THE UNITED STATES.

During the past ten years the horse breeding industry in the United States has undergone considerable development,

but it has now reached a point where there is difficulty in supplying the demand for good horses. This has been caused by the increasing export, and the large home demand for horses of a high class, both for riding and driving and for light and heavy draught work. Probably more horses were kept for private use in the cities ten years ago than now, but they were chiefly of a common class, and with the advent of the bicycle and electric cars these diminished, and the animals now kept are of a much higher class.

There were, on the 1st January last, 13,538,000 horses and 2,086,000 mules in the United States. Of the former nearly two-thirds, viz., 8,462,000, were in the Middle States, the only State credited with over a million being, however, Texas, with 1,126,000, in the South. This was followed by Illinois and Iowa, each with about 980,000, while both Kansas and Missouri had over 700,000 head. Mules are almost entirely confined to the Southern and Middle States, Texas, with 261,030, ranking first in this respect.

The natural horse of the United States—the *cayuse* or *broncho*—was improved in the early history of American horse-breeding by the use of thoroughbred and hunting sires, which resulted in progeny of good stamina and courage, but of small size. About 1875, through the influences exerted by State and national associations, considerable interest was aroused in the heavier breeds of horses, and, in the next fifteen years, millions of dollars were expended by American horse-breeders in the importation of the choicest stallions and mares from the United Kingdom and Continent of Europe. These breeds included mainly the Hackney, Clydesdale, English Shire, Norman, Percheron, Belgian, and French coach horses. The effects of this infusion of new blood have greatly improved the quality, size, and bone of the horses in general use on the farm and for sale on the market.

The types of the American horses now put upon the market may be generally classified in eight groups, viz., cobs, coach horses, saddle horses (English type), American saddle horses, roadsters, draft, range, and southern horses. The two latter represent a very much lower grade than the others, while the second class (coach horses) fetched the highest average price at the Chicago market in 1900.

While horses are bred in all the States of the Union, there are few which do not purchase for use more than they sell. Illinois, Iowa, and Minnesota are the three States which produce many more than they want; while Missouri and Kansas sell many southern horses, and Oregon, Nebraska, and Wyoming supply many range horses. Comparatively few horses are bred in the Eastern States.

Of the 225,000 horses annually sold, on the average, at the principal markets not more than 25 per cent. can be classed as good, the remainder being "plugs," or partly worn horses. At the present time the visible supply of desirable horses, for all purposes, of four and five years old, is estimated at about 100,000, or barely enough to supply the average demand, and there is also a scarcity of three-year-olds, but younger horses are more plentiful, and the supply should be more ample in future. Prices at Chicago, it may be noted, have increased from £3 to £11 per head in the past four years.

There are fourteen markets in the United States through each of which more than 10,000 horses and mules passed in 1899, St. Louis being first with about 120,000, half of which were, however, mules. Chicago came next with 110,000, which included practically no mules. Buffalo (over 60,000) and New York (over 50,000) followed; these two towns probably get the highest prices, and the majority of the horses sold there have already passed through a western market. Excluding the two latter cities, some 55 per cent. of the horses sold during the last three years went through the Chicago market, and 26 per cent. were sold at St. Louis; the most important places after these two being Kansas City, St. Joseph, Omaha, and Sioux City.

The suitability of the American horse for European commercial purposes was first recognised in 1893, when small experimental shipments were made. Since then the trade has rapidly increased from 3,000 in 1893 to 65,000 in 1900. The greater number go to Great Britain, but during the past year there have been large shipments for the British and German armies in South Africa and China respectively.

The average value of all the horses exported is about £22 to £25. Of the exports to the United Kingdom about 90 per cent. are draught horses (including omnibus and tram horses); 7 per cent. high class carriage horses; and 3 per cent. trotting and light carriage horses.

To land Chicago horses in the different ports of Europe costs from £6 to £8 per head.

Pedigree horses for breeding purposes are allowed to enter the United States free of Customs duty, and about 1,000 are annually imported. The average value has of late years been from £60 to £90 per head, those from the United Kingdom being worth on the average considerably over £100. In point of numbers, Canada sends most, but these are only valued at about £20 per head. Of animals subject to duty, the United States imports from 1,000 to 1,500 head annually; they are valued at an average of about £30 each.

[*Foreign Office Report, Miscellaneous Series*, 1901, *No.* 563. *Price* 1*d.*]

EXPORTS OF FARM PRODUCE FROM CHERBOURG TO THE UNITED KINGDOM.

Mr. Consul Loftus, reporting on the trade and agriculture of the Consular District of Cherbourg in the years 1899 and 1900, states that notwithstanding the quality and packing of Normandy butter from that port, the trade has suffered from the increased competition in the importation into the United Kingdom of Russian, Danish, and Australian butters. During the first half of 1899, nearly 3,000 tons of butter were exported from Russia, a very large proportion of which found its way to the United Kingdom. From 1897 to 1900 the returns in the export of butter from Cherbourg show a decrease of 4,240 tons.

The export of milk and cream, carried on by an English firm at Cherbourg, shows an increase from 176 tons in 1899 to 474 tons in 1900. It is put into English milk cans in France, and shipped to Southampton, thence by rail to London.

Potatoes are grown in very extensive market gardens in the neighbourhood of Cherbourg, at Tourlaville, and St. Pierre, where an excellent chemical manure, specially mixed, is extensively used in their cultivation. The potatoes are packed in small barrels weighing about 40kilos. (88 lbs. English), and shipped to London, *via* Southampton, by boats leaving nightly, the cost of freight being 32s. 6d. per ton. The highest figure reached in the export of potatoes was in 1899, when 3,510 tons were despatched from Cherbourg. A slight diminution is shown for 1900, when 2,923 tons were exported. On the whole, this trade was well maintained.

Cauliflowers and cabbages are very largely exported to the United Kingdom, *via* Southampton, their average price being 1s. per dozen net, and the freight to London 32s. 6d. per ton. In 1899 2,700 tons were exported, but in 1900 only 1,104 tons were sent from Cherbourg.

The export of fruit did not assume very considerable proportions from Cherbourg during 1899, scarcely more than 20 to 25 tons being despatched to the United Kingdom during that year; the year 1900, however, showed a great improvement, principally due to shippers having recognised the advantage possessed by this port, where steamers can nearly always enter and leave at fixed hours, thus ensuring a more punctual delivery of goods. In 1900 the export of fruit to the United Kingdom reached 525 tons, an increase of 500 tons on the previous year. Formerly, considerable quantities of strawberries, grown mostly in the neighbourhood of Brest, near Plougastel, and Dooulas, were exported *via* Cherbourg to the United Kingdom. This trade has greatly, if not almost entirely, fallen off since the establishment of a direct steamer calling at Brest during the strawberry season, and going direct to Plymouth.

Fruit of all kinds, *i.e.*, pears, apples, nuts, and prunes, grown in Anjou, are mostly exported to the United Kingdom through Honfleur and Caen, and a certain quantity passes through Cherbourg. A great deal of this fruit is sent to Birmingham and Manchester.

[*Foreign Office Report, Annual Series, No.* 2670. *Price 2d.*]

SIBERIAN BUTTER TRADE.

The Board have received through the Foreign Office a report by Mr. Henry Cooke, Commercial Agent in Russia, giving the following information concerning the export of butter from Siberia, taken from the official "Commercial and Industrial Gazette" of St. Petersburg, of August 2nd, 1901 (new style):—

Butter making in Siberia is chiefly carried on in the districts along the Siberian Railway between the river Tobal (town of Kourgan) and the Ob (Krivoshtchekova), a distance of 733 miles, or over an expanse of territory of about 150,000 square miles, assuming only 66 miles on either side to represent the sphere of influence of the railway.

Butter production in Siberia by the aid of separators dates from 1893, when the first dairy works of the kind were opened in the district of Kourgan. An agricultural show at Kourgan in 1895 spread the new method of production, while the Exhibition held at St. Petersburg in 1899 by the Imperial Economic Society brought the Siberian product to the notice of foreign buyers. The use of separators has now extended from the western to the eastern districts, and covered the above-mentioned region. It will, doubtless, soon extend to the whole of the Barnoul, Biisk, and Semipalatinsk districts. The old method of disposal, once a year only, through the medium of the autumn fairs, chiefly at that of Ishim, has been practically abandoned both by Siberians proper and by Russian settlers.

The chief impulse favouring the change was the opening of offices by foreigners for the purchase of butter in the centres of production themselves, first at Kourgan, then at Omsk, and now at other considerable butter exporting stations. And, as a natural consequence of these offices buying butter not on credit but by settlement on delivery, or buying on commission, with advances of 90 per cent. of the local cost, there grew up a tendency to form village dairy associations, this being the case more especially in the Omsk region during last winter. The Moscow Imperial Agricultural Society came to the assistance of the new industry by opening

branches at Kourgan, Tomsk, and Omsk. By means of shows and periodical meetings of manufacturers and exporters, arranged by the Kourgan branch of the above Society, producers and exporters have been able to come into constant intercourse with one another, to exchange views in general, and to work out the best conditions and arrangements possible for the direct export of Siberian butter to the consuming markets, at the head of which is London, so as to do away as far as possible with intermediaries, hitherto mostly Danes.

The export of Siberian butter to foreign countries first began to assume appreciable importance in 1898.

The following figures show the increase (1) of the export across the Urals from the above-mentioned area of production, and (2) of the export abroad by European frontiers, according to official statistics :—

Year.	Export of Siberian Butter across the Ural by Rail.	Export of Butter from the European Frontiers of Russia.	
		Quantity.	Value.
	Tons.	Tons.	£
1898 - -	2,407	9,935	699,788
1899 - -	4,083	10,161	746,243
1900 - -	17,496	19,339	1,425,714

In spite of this growth, attained in so brief a period, much yet remains to develop the butter industry of Siberia, which is not only behind that of European and other countries, but inferior even to that of Finland; the share of Russia in the international market in the trade of dairy produce reaching but 1½ to 2 per cent., and this only for the last year or two, thanks to the development of Siberian butter. The financial resources resulting from the increasing export cannot, however, but serve to raise the material welfare of the people, and, in consequence, lead to an improvement in the breed and care of the cattle, and to an increase of stock. The conditions of export are not altogether favourable, more especially

as regards rail facilities. Thus, during the high summer temperatures last year, Siberian exporters, owing to the insufficiency of refrigerating trucks, had to send the consignments, which were continually arriving at Omsk from the surrounding districts, in ordinary goods trucks, with small casks of ice packed in. As a result of being transported in this way over a distance of 2,400 miles, from Omsk to Reval, part of the butter was only fit for cart grease. Prices fell in consequence at the producing centres from 12 roubles per poud net (36·112 lbs.) towards the end of June, to 9 roubles in September. At the present time 160 special refrigerating trucks have been assigned for the carriage of butter by the Siberian railway, of which number 125 will be granted to Riga firms for the special Riga train, the butter being then sent on from that port in the special steamers direct to London. Considering that a special truck can carry over 7 tons gross of butter, that the truck so loaded will be at least two weeks on the way from the Ob to the Baltic ports, and the same time returning, it will follow that during the seventeen summer weeks (May-August) each truck can make four trips, carrying altogether about 29 tons. Consequently, all the 160 trucks can carry, starting from the various stations between Kourgan and Ob (a stretch of 733 miles), a maximum quantity of about 4,650 tons, or some 270 tons per week. There is every reason to expect that this weekly quantity will be despatched from Omsk alone, whence in 1900 one-fifth of the total amount of Siberian butter was despatched, and one-sixth of all the butter exported abroad from Russia. And there are several exporting stations as important as Omsk, such as Kourgan, Ob, Tatarskaia, and Kainsk. There will remain, therefore, some four-fifths of the production to be disposed of, which will have to be transported either in ordinary trucks fitted out for the carriage of butter, or as last year, in common goods trucks, with small ice casks in each, the latter requiring to be continually refilled en route, entailing delays and possibly disastrous results to the butter.

These transport questions, and others connected with the conditions of export, Mr. Cooke points out, all require atten-

tion before Siberian butter will really acquire a solid hold on the foreign market.

DANISH TRADE IN DAIRY PRODUCE IN 1900.

In a report to the Foreign Office on the Trade and Agriculture of Denmark in 1900, Captain Boyle, His Majesty's Consul at Copenhagen, gives the following account of the Danish trade in butter, bacon, and eggs in 1900. The export of butter reached 1,531,000 cwts., which is an increase of about 95,000 cwts. over 1899, when the total export was 1,436,500 cwts.; 36,200 cwts. was exported in tins, all the rest was in casks. Danish produce under this head was 1,189,300 cwts., and this figure is about the same as 1899, when it was 1,188,200 cwts. As usual, the greatest amount of butter exported went to the United Kingdom, viz., 1,475,000 cwts. out of a total of 1,530,000 cwts.

Considerable quantities of Russian and Siberian butter are imported at Copenhagen. In 1900 the amount was 275,000 cwts., which is 100,000 cwts. more than in 1899. Since the Siberian Railway has been opened, Copenhagen has become the centre for this trade, and for the distribution of Russian butter to England, Germany, and for home consumption in Denmark.

The average butter quotations at Copenhagen were about the same as in 1899, but higher than in the preceding years.

The home consumption of margarine from April 1st, 1899, to March 31st, 1900, was 366,168 cwts., against 322,411 cwts. the year before, or an increase of 43,757 cwts. The total production of margarine in Denmark was 325,309 cwts.

Danish bacon is stated to have obtained higher prices on the British market during 1900 than in 1899. The London quotation was about 1⅛d. per lb. higher than in 1899. The exports of bacon from Denmark to the United Kingdom dropped from 1,320,000 cwts. in 1899, to 1,186,000 cwts. in 1900; but in spite of this the value increased by about £55,000, viz., from £1,640,000 in 1899, to £1,695,000 in 1900.

The export of Danish eggs amounted in 1900 to 14,750,000 score; in 1899 it was 13,600,000 score. The value of the eggs exported in 1900 was £931,000.

SEED-TESTING STATIONS ABROAD.

Seed-testing stations have been established in most of the leading Continental countries. Such stations usually form a branch of the agricultural experiment stations, but in a few cases separate establishments have been started solely for the purpose of seed-testing.

An important feature of the work of many of the stations is the so-called "seed-control," which consists in an arrangement whereby seedsmen enter into an undertaking with the authorities of the station to sell their goods with certain guarantees of purity and germination, based on the results of analytical tests made at the station of the samples submitted by them prior to the sale of the seeds, and agree to accept the results of examinations made at the stations of samples taken by the buyers from the goods as sold, as the determinant of any question which may arise as to the correspondence of the goods with the guarantees. Some of the Swedish, Finnish, and Austrian stations also certify as to the quality of seeds in bulk by drawing samples on the seedsmen's premises, and furnishing tags to be attached to sacks containing seeds which come up to certain standards of purity and germination; but this practice has not made much progress outside the countries named. In addition to the testing of seeds for seedsmen and agriculturists, experimental and research work in agricultural botany is also carried out at a number of the stations.

The permanent staff of a station usually consists of a director (except in cases where seed-testing forms part of the work of an agricultural experiment station) with one or two male or female assistants, and a fluctuating staff of girls for seed-counting and germination work. The cost is defrayed

partly from the fees derived from the control work, and most of the stations are supported by State subventions and by grants either from provincial funds or from agricultural societies.

In Germany, there are thirty-nine establishments for the testing of seeds, many of them being branches of agricultural experiment stations, which are supported by general subventions from the State, while some are supported by grants from provincial authorities and agricultural societies. Twenty of these seed-control stations are situated in Prussia, twelve being attached to agricultural experiment stations receiving State subventions for all purposes ranging from £120 for the smaller stations to £850 for the larger establishments, while ten of the twelve also receive grants from provincial funds, and seven of them are assisted by grants from agricultural societies. Four stations are attached to agricultural experiment stations which are not State-aided, but are supported by agricultural societies, three are purely control stations (two are managed and maintained by agricultural societies, and one is a private concern), and one, also a control station only, is attached to an agricultural winter school. The twelve stations in receipt of State grants were founded by agricultural societies, and are managed by committees appointed by these bodies. From reports published by eighteen of the Prussian seed-testing stations it appears that in 1897 the number of samples tested at these establishments was 11,543. For three stations details are furnished of the number of samples submitted by farmers and seedsmen, the totals being 296 and 719 respectively. The procedure at German seed-testing stations is based on rules drawn up in January, 1898, by the Association of Agricultural Experiment Stations in order to secure uniformity of methods in seed-testing.

In Austria-Hungary, there are sixteen seed-testing stations, some of which are private establishments, while six are supported by the State and two by agricultural societies. The most important of the Austrian stations is that at Vienna, which is maintained by the Imperial Agricultural Society, and also receives a State subvention.

In Belgium, seed-testing is undertaken at the nine State agricultural experiment statons.

In France, where seed-testing has apparently not made much progress among farmers, there is only one station, at Paris, which is attached to the Institut Agronomique, and is supported by the State. In 1897-98, thirteen firms were reported to be under the "control" of the Paris station, but the director states that although the customers of these firms are entitled to gratuitous tests of the seeds purchased by them, they seldom exercise the privilege.

In Denmark, there is one important station at Copenhagen, which is supported and managed by the State.

The Swedish seed control stations, which number eighteen, are usually attached to the agricultural experiment stations. They are, however, supported by special grants from the State and from societies (and, in three cases, from provincial funds), and work under the direction of the State Agricultural Department.

In Norway, there are three stations, two of which are attached to the State chemical control stations at Christiania and Trondhjem. The State grants for seed control work amount in all to £120, and in two cases the grant is made contingent on local support.

The Scandinavian stations adopted uniform methods for seed-testing in 1890 in accordance with rules drawn up by a committee appointed by the Governments of Denmark, Sweden, and Norway.

In Finland there are seed control stations in connection with the chemical experiment stations at Abo and Helsingfors.

In Switzerland there is an important station at Zurich and another at Lausanne; both are partly supported by the State.

Seed-control work has not yet been established on a large scale in the United States, although many of the agricultural experiment stations have been engaged in seed investigation for a number of years. Regulations for seed-testing were drawn up by a committee of the Association of American Colleges and Experiment Stations in January, 1897, and were published by the United States Department

of Agriculture in February of the same year. This action of the Central Department may be regarded as the first attempt to establish a system of seed control in the United States.

In none of the above-named countries, with the exception of the United States, is there any special legislation requiring seedsmen to guarantee the purity or germination of the seeds sold by them. But the agreements signed by firms under the "control" of a seed-testing station are sometimes of such a character as to bring the voluntary guarantee furnished in accordance with such agreements within the jurisdiction of the civil courts, though an appeal to such tribunals is seldom necessary. In the United States one example, at least, is forthcoming of a seeds law, viz., in the State of Maine, where an Act to regulate the sale of seeds has been in force since September, 1897.

[*Committee on Agricultural Seeds, Cd.* 493.]

Artificial Manures Industry in Germany.

A report on chemical instruction in Germany, and the growth and present condition of the German chemical industries, by Dr. F. Rose, H.M. Consul at Stuttgart, contains some interesting information as to the development of the industry and the employment of artificial manures in that country.

Dr. Rose states that in the year 1840 Justus von Liebig, in his classical investigations upon the application of chemistry to agriculture and physiology, maintained that, if soils are not to become impoverished, those salts of which they are deprived by agriculture must be restored to them in the form of manure. He demonstrated, for instance, that an acre of potatoes required about 90 lbs., and an acre of beetroot about 150 lbs. of potassium salts, and that further, the usual manures, wood-ash, beet, and wool refuse were themselves derived from the soil. These considerations were instrumental in leading to the discovery and working of the

potassium salt mines at Stassfurt, and of the Anhalt salt strata.

Prussia began to mine the potassium salts at Stassfurt in 1860, and up to 1890 the value of the total quantity mined amounted to £6,000,000. Anhalt followed shortly afterwards with an even larger amount, as it possesses the mineral kainit, which is extremely valuable for agricultural purposes. The total value of the production from Prussia and Anhalt between 1860 and 1890 amounted to £11,500,000 (3,181,878 tons). In 1890 itself there were extracted from mines 362,000 tons of kainit and 913,000 tons of other potassium salts; quantities which had increased to 1,104,000 tons of kainit and 1,105,000 tons of other potassium salts in 1898.

In 1872 Germany produced 5,000 tons of sulphate of ammonia, the European production being 42,000 tons; in 1897 Germany produced 16,000 tons in the various gasworks and 74,000 tons in the coke ovens, or together 90,000 tons. The 74,000 tons from the coke ovens could perhaps be trebled if all the ammonia which is allowed to escape into the air during the formation of coke were utilised.

The home production was, however, not sufficient to meet the demand, because ammonia is not only needed for agricultural purposes, but latterly also for the manufacture of soda, aniline dyes, ice, and for cleaning wool. For this reason about 26,000 tons of sulphate of ammonia, valued at £275,000, were imported in 1897.

The import of saltpetre (chiefly Chili saltpetre) into Germany has also grown with great rapidity from 6,700 tons in 1860 to over half a million tons in 1899.

The production of superphosphate of lime in Germany was only 1,000 tons in 1867, and 7,600 tons in 1872; this had increased to 400,000 tons in 1883 and to 750,000 tons (for which 400,000 tons of sulphuric acid were required) in 1899. Almost the total German consumption of superphosphate is now produced at home.

The discovery of superphosphate of lime is principally attributed to Liebig, who in 1848 advocated the treatment of bones for manuring purposes with sulphuric acid, in order to enable them to be more easily assimilated by the soil. The

great increase in the manufacture of superphosphate of lime, and the consequent speedy exhaustion of the bone supply, soon rendered the working of the mineral phosphates necessary.

Although at present the world's production of ground bone amounts to about 75,000 tons, no appreciable amount is converted into superphosphate, as the latter is now almost exclusively prepared from mineral phosphates. America, with her immense mineral resources, led the way; she mined 1,278,330 tons in 1898 and 1,767,310 tons in 1899. Of this latter amount 900,000 tons, valued at £15,000,000, were exported, no less than 218,000 tons going to Germany for conversion into superphosphate of lime.

For a long time German agriculture was content to follow in the wake of the United Kingdom; but, during the past thirty years, a large number of chemists at the various agricultural academies have been engaged upon the scientific and technical extension of the theories promulgated by Liebig. One of the tangible results of their studies is the application of the ground slag of the Thomas-Gilchrist steel process to manuring purposes. Of this slag the production amounted in 1899 to about 900,000 tons, of which about 100,000 tons were exported. This industry is of recent date, the output in 1886 having been only 25,000 tons.

In this connection it may be noticed that H.M. Consul-General at Berlin thinks that there might be a demand for basic slag of English manufacture in Germany.*

Germany's annual requirements of artificial manures have been estimated as follows:—Superphosphate, 500,000 tons; slag phosphates, 400,000 tons; ground bone and guano, 70,000 tons; precipitated phosphates, 5,000 tons; Chili saltpetre, 350,000 tons; sulphate of ammonia, 90,000 tons; potassium salts, 600,000 tons; or a total of a little over two million tons.

* *Foreign Office Reports, Annual Series, No. 2671.*

WOOL TRADE OF GERMANY IN 1900.

H.M. Consul-General at Hamburg states that the total importation of raw wool into Germany in 1900 was 21 per cent. smaller than in 1899; and while the imports of textile goods showed an increase of 11 per cent. last year, the importations of woollen yarns experienced a decrease of 6·5 per cent. as compared with 1899. As was to be expected, trade with Cape Colony suffered severely from the effects of the war in South Africa, and only 80,000 bales of Cape wool were imported into Germany in 1900, as against 155,000 bales in 1899.

The export of raw wool from Germany was about 8 per cent. less than in 1899; woollen yarns were exported in about the same quantity, but the exports of woollen textile goods showed a falling-off of about 2 per cent.

Though the importance of the German woollen industry, in so far as regards the quantity of raw wool consumed in that country, is not equal to that of the United Kingdom, it is not very far behind the latter. The average annual consumption of raw wool in both countries, calculated according to the quantity respectively produced, imported and exported during the last five years, is estimated as follows, viz.:—

———	United Kingdom.	Germany.
	Cwts.	Cwts.
Production	1,230,000	430,000
Imports	6,630,000	3,410,000
Total	7,860,000	3,840,000
Exports	3,200,000	190,000
Consumption	4,660,000	3,650,000

These figures show that the German consumption of wool is almost three-quarters of the extent of the British. But whilst the United Kingdom is able to supply more than 26 per cent. of its total wool consumption from its domestic production, German sheep-breeding is only able to furnish about 12 per cent. of the quantity of wool consumed annually in that country. The number of sheep in the

United Kingdom in 1899 is given at over 31,000,000; the annual wool production varied during the last five years between 135,000,000 and 140,000,000 lbs. (avoir.), the average production per annum having been, therefore, 137,000,000 to 138,000,000 lbs. of wool. In Germany sheep-breeding appears to have been steadily diminishing in extent during recent years; for while the number of sheep in 1873 is stated to have been 24,999,406, in 1883 only 19,189,715 sheep were counted, in 1892 only 13,589,612, and in December, 1897, only 10,866,772 sheep.

Beet-Sugar Industry in Sweden.

The production of beet-sugar has become, during the last few years, one of the principal industries of Sweden, and the value of the annual imports has been reduced by over a million sterling. The industry, which cannot exist without considerable protection, encountered great obstacles before attaining its present prosperous condition, owing to the opposition of the advocates of free trade. The sugar refiners also strongly opposed it at first, but have now purchased the greater part of the shares.

It is stated that the industry, originally established to further the interests of agriculture, has failed to attain that object, the cultivators finding themselves in the power of the capitalists, who, to render themselves independent of the farmer, are purchasing considerable properties in Scania, the most fertile province of Sweden.

In 1896-97 the supply of raw sugar exceeded the demand by 20,000 tons; but in 1898 and 1899 there was a large deficit in the production, and considerable quantities of sugar had to be imported.

[*Board of Trade Journal, July* 18*th*, 1901.]

Live Stock Trade of Mexico.

According to a report to the Foreign Office on the trade of Mexico in 1900, it appears that stock-raising of all kinds

continues in a prosperous condition, although, as will be seen by the table below, the exports of horned stock have again declined during the past year. In many of the northern parts of the country, especially in the States of Chihuahua, Coahuila, and Nuevo Leon, large tracts are now devoted to grazing and fattening of cattle, and also in some parts of the States of Jalisco, Michoacan, and Puebla, where foreign stock has been brought to cross with native breeds.

The value of foreign cattle imported for breeding purposes during the year 1900 was £21,281, the imports including calves and heifers as well as full grown animals. It is impossible to say what was the actual number of head, as the returns are given by weight, on which the duty is levied. The total value of all other animals imported for breeding or other purposes was £30,628. Mules and horses for draught purposes rank next in value to cattle.

The value of the exports of live animals from Mexico in 1900 was £637,836, as against £634,710 in the previous year, and the number of head shipped in 1900 compared with the three preceding years is shown below :—

	1897.	1898.	1899.	1900.
Horned Cattle	313,290	213,333	193,256	176,781
Sheep	159,941	30,943	2,763	14,292
Hogs	6,852	8,918	5,416	2,459
Horses, mules, and asses	4,478	2,233	4,901	7,026

The increase in the number of horses, mules, etc., was accounted for in a large degree by a greater demand for Mexican horses, 5,251 having been exported in 1900.

The Mexican horse, though not so large as the European or American animal, is much stronger, and better able to endure the fatigues incident to mountainous countries and the continual climatic changes so often experienced by armies in time of war. Last year several of these animals were purchased by agents in the United States for the use of the troops in South Africa.

[*Foreign Office, Annual Series*, 2693.]

BELGIAN MEAT LAW.

By a law dated 28th May, 1901, coming into operation on the 1st October next, the trade in preserved meat and food prepared from animal products is subjected in Belgium to the following provisions.

Food prepared wholly or partly from horseflesh must be provided with a clearly legible notice to that effect.

All prepared or preserved meats containing matters other than spices, condiments, eggs, or gelatine must bear a label showing what additional substances have been added. The qualification "pure" is reserved for such food prepared without the addition of vegetable matter other than spices or condiments. Fresh or preserved meats which have been coloured must bear a notice to that effect.

Meat juice, gravies, extracts, peptones, etc., must be sold in receptacles bearing a label giving exact information as to their nature or bearing some special designation if the meat has undergone any manipulations other than those necessitated by its preparation, or if it contains any foreign substance other than salt, these facts must be stated.

Food prepared from meat recognised as unfit, or containing salicylic acid, formic aldehyde, or sulphurous compounds, as well as meat extracts, peptones, etc., containing any antiseptics, are held to be injurious and may not be sold.

Boxes, pots, etc., containing food prepared from animal products must also bear the name and address, or at least the trade mark of the seller.

Meat and its derivatives not intended for human consumption may be stored in premises devoted to the sale of such commodities unless intended as food for animals, in which case they must be in receptacles showing clearly the purpose for which they are intended.

HORSE BREEDING IN HOLLAND.

A copy has been received through the Foreign Office of a law sanctioned on the 21st June last regulating horse breed-

ing in the Netherlands. By a subsequent decree, the 1st September, 1901, is fixed as the date upon which the law comes into operation.

The main features of this law are briefly as follows :—

For the covering of mares only stallions may be used which have been approved, for the Province in which the covering takes place, by Commissioners appointed for the purpose. This provision does not apply to stallions and mares which are, and have been for the preceding ten days, the property of the same person or persons in full and unconditional ownership.

As a rule, staggers, defective eyes, respiratory organs, etc., lead to the rejection of the stallion, but there are exceptions with regard to roarers.

Subsidies amounting to at least 75,000 florins (£6,250) will be appropriated annually by the State for horse-breeding ; and, in addition, the expenses of inspection, of the employment of stallions, and of premiums, will be borne by the State.

Penalties are laid down for infractions of the law, and authority is given to all persons charged with its execution to enter homesteads, premises, etc., under certain restrictions.

Importation of Hides into the United States.

The Treasury Department of the United States have issued a circular, dated 30th July last, to the customs officers in that country, which, after referring to the regulations affecting the importation of hides, proceeds as follows :—"It having been stated that hides of neat cattle are shipped to the United States without proper disinfection, officers of the customs are directed, with a view of preventing the introduction and spread of contagious or infectious diseases among the cattle of the United States, to treat the same as prohibited importations, and to refuse entry for warehousing or consumption of all hides of neat cattle, including

calf-skins, hide cuttings or parings, and glue stock the product of neat cattle shipped from or the product of the countries of Europe, Asia, Africa, Australia, and South America, except those which have been dry salted or arsenic cured, or lime dried after a soaking for forty days in a strong solution of lime, and except abattoir hides the product of Sweden, Norway, and Great Britain*, in all cases where the invoices are not accompanied by proper certificates of disinfection. As consular officers have been instructed to refuse authentication of invoices of hides not properly disinfected, the disinfection in the United States, or storage of such hides in general order warehouse, will not be permitted, as the passage of diseased hides through the country, or their storage with other goods, would tend to disseminate cattle disease in the United States."

Hop Production in Washington and Oregon.

In a recent number of the United States *Crop Reporter* it is stated that the production of hops in Washington is largely confined to the western half of the State, while in Oregon it is practically limited to the Willamette Valley. According to a commercial estimate, which was considered reliable by the United States Department of Agriculture, the production of Washington in 1894 and 1895 was 49,000 bales and 28,800 bales, and that of Oregon 63,000 and 99,500 bales respectively. In 1896, however, it fell to a lower figure than for many previous years, but since that date considerable progress has been made. Low prices, and more especially the ravages of the hop-plant louse, were the chief causes of the depression, but success in combating the pest, together with rising prices, has given new life to the industry, and led to an extension in the area cultivated; and the production of Washington in 1900 was estimated to amount to 33,254 bales and in Oregon to 81,200 bales.

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* Moist hides imported from these three countries are admitted without disinfection into the United States upon the production of certificates that they are the product of such countries, and stripped from perfectly healthy cattle in those countries. (*See Journal of the Board of Agriculture, Vol. V., March*, 1899, *p.* 513.)

Sugar Bounties in Bulgaria.

A report by H.M. Agent and Consul-General at Sofia states that the yield of sugar-beet in Bulgaria in 1898 was 6,237 tons, which increased to 9,311 tons in 1899, and to 27,560 tons in 1900, while a total of 45,000 tons is expected in the current year. In 1899 the Government, on the representation of the Factory Company that they could not otherwise compete with foreign bounty-fed sugars, agreed to give a bounty of five francs per ton of beets delivered at the factory. The price paid to the producers of the beet was in consequence increased by that amount; while, in order to obtain a footing in the local markets, the native sugar has been sold at a price rather lower than the foreign. The Sobranjè has, however, refused to pass the credit for this year's bounty, and the Factory Company, who say that they have already made heavy advances to the cultivators on account of the growing crop, threaten to repudiate their contracts with the peasants, and close the factory unless the bounty is granted.

[*Board of Trade Journal, July* 18*th*, 1901.]

Experimental Shipments of Fruit from the United States.

The Board have received information through the Foreign Office that in the last session of Congress there was included in the appropriation for the Department of Agriculture a sum of 20,000 dollars (about £4,166) for pomological investigations. Among the objects to which the money was to be applied is the investigation of the market conditions affecting the fruit trade in the United States and foreign countries, and the methods of harvesting, packing, storing, and shipping fruit and vegetables, and for experimental shipments of fruits to foreign countries, for the purpose of increasing the exportation of American fruits.

Under this appropriation the United States Department of Agriculture is making arrangements with dealers and exporters to guarantee a minimum net return per package on all fruit shipped and sold under the direction of the

Pomological Division. By this arrangement the exporter would receive the net proceeds of the sales, and if this net return is less than the guaranteed amount, the difference would be made up out of the money appropriated for pomological investigations. An account of the results of experiments made in shipping soft fruit from California to British ports is given on page 250 of this Journal.

Completion of Small Scale Map of England and Wales.

The Ordnance Survey have completed the publication of the map of England and Wales on the scale of four miles to one inch. This is a general map of the country, and is likely to be useful to cyclists and others who require a considerable area of country on one sheet. It shows all the principal roads, railways, rivers, towns, villages, large woods and numerous altitudes. The map is published in twenty sheets, each measuring 22½ inches by 15 inches, at the price of 1s. 6d. per sheet engraved. Another edition of this map is being prepared, publication of which will shortly be completed, by counties or groups of counties, on thin paper price 6d. per sheet, or 9d. if folded in a cover.

Wheat and Barley from Morocco.

Information has been received through the Foreign Office that the Sultan of Morocco has given orders that wheat and barley may be exported from all Moorish ports during a term of six Moorish months—approximately from August 16th, 1901, to March 3rd, 1902. An export duty of 15 reales de vellon per fanega (of 98½ lbs.) on wheat, and 6 reales de vellon per fanega (of 73 lbs.) on barley, will be levied. No further shipment will be permitted after the above-mentioned date.

Argentine Frozen Meat Trade.

The impetus given to the Argentine frozen meat trade by the closing of European ports to Argentine live-stock is likely to be maintained. According to a report by H.M. Acting-Consul at Buenos Ayres, it is only a question of time and capital for this industry to assume much larger proportions, though the distance from the European ports is naturally a drawback in competition with Canada and the United States. The following figures show the exports of frozen sheep carcases and quarters of beef for the year 1899 compared with the totals for 1900 :—

Year.	Quantity.	
	Mutton.	Beef.
	Carcases.	Quarters.
1899 - - - - - - - - -	2,485,949	113,432
1900 - - - - - - - - -	2,372,869	261,365

It will be seen that the number of quarters of beef exported last year is more than double the number shipped in 1899 though mutton carcases show a falling-off of 113,080. It is worthy of note that all this meat is carried in British vessels.

[*Foreign Office Report, Annual Series, No.* 2615.]

Projected Grain-loading Facilities at Buenos Ayres.

In a report to the Foreign Office the Acting Consul at Buenos Ayres states that grain elevators are shortly to be built in Buenos Ayres by the Buenos Ayres and Rosario Railway and the Central Argentine Railway Companies. The project will effect an improvement that will benefit British shipping and the port very materially. These elevators are to be erected on the south side of Dock No. 2 ; their capacity is to be about 100,000 tons ; vessels will be loaded more quickly than heretofore, being able to come alongside the elevators. Steamers often going to up-

river ports to load will now be able to obtain their cargoes at Buenos Ayres, the cost of freight to that port by railway being, it is presumed, calculated to be under that of the cost of freight and expenses of a steamer to up-river ports (under existing conditions). The expenses caused by vessels going up in ballast to load, and the delay in loading at those ports plus possible delay caused by heavily-laden steamers getting into shallow water in a falling river, will thus be saved. It is contended that elevators might be advantageously situated at various points of the river close to the wheat-growing districts, and thus a second handling of the grain be avoided. One of the principal results of the erection of elevators in Buenos Ayres will be the facilities afforded for the loading of grain in bulk, and thus a saving of time and expense for all concerned. The Consul adds : "I feel safe in asserting that in a few years from now no more wheat or maize will be shipped from this port in bags than is absolutely necessary to fulfil the loading regulations prescribed by the authorities."

[*Foreign Office, Annual Series*, 2615.]

Warsaw Wool Fair.

The Warsaw wool fair took place this year on June 15th and 17th. This fair is of most importance to Polish and Russian buyers, although two or three representatives of German firms usually attend, but these made no purchases this year, as prices were higher than abroad. The amount of wool offered for sale amounted to just over 2,000,000 lbs. (including 200,000 lbs. stock from the preceding year), and the whole of this was sold. The quantity was larger than it had been since 1897.

[*Board of Trade Journal, July* 18*th*, 1901.]

German Corn Trade with the United Kingdom.

Mr. Consul-General Schwabach, in a report to the Foreign Office on the trade of Germany in the year 1900, states that the corn trade between the United Kingdom and Germany, which was formerly so flourishing, has fallen off considerably during recent years. One reason

is that trans-oceanic producing countries have their own representatives in the principal commercial centres of Germany, so that the intermediary trade between the lands of production and the Continental markets, formerly exclusively in British hands, has now disappeared. The only remains of this trade may be seen in a few shiploads coming from the East Coast, but even these become fewer and fewer. But there was rather a brisk export of German wheat and rye to the United Kingdom. The principal kinds exported were Pomeranian, Mecklenburg, and Holstein wheat; the produce of East and West Prussia and of Posen was retained in Germany on account of its superiority in gluten.

[*Foreign Office Report, Annual Series, No.* 2,671. *Price* 2½*d.*]

Castor-oil Seed Cake as Manure.

A memorandum, prepared by H.M. Consul-General at Marseilles, has been received from the Board of Trade with reference to the manufacture of castor oil at that city. It is pointed out that, in addition to the climate, Marseilles possesses two great advantages over British manufacturers of castor-oil for industrial purposes: these are cheap labour and a ready sale for oil-seed cake. The castor seed residue is put at about sixty per cent. of the seed used, and on the basis of an annual import into Marseilles of about 25,000 tons of seed, it is estimated that 15,000 to 20,000 tons of castor-oil cake are annually used, within a short radius of that city, by market gardeners for the raising of early vegetables. It is stated that there is no similar demand for this cake in England, and that some of British manufacture has even been put on the Marseilles market.

Export of Californian Soft Fruits to Great Britain.

In the spring of 1892, experimental carload lots of tomatoes from Florida were shipped to England, the first going forward from New York on the steamer *Majestic*, April 27th. Later in the season five shipments of Californian peaches, pears, and plums, aggregating twenty-four carloads

of 20,000 each, were forwarded to Liverpool from New York. These shipments were made in refrigerated compartments containing four or five carloads each, the latter quantity being required to fill a compartment. The departure of the fruit from California was timed to correspond with the sailing date of the ship for which it was destined, and the total time from shipping point to Liverpool and London was seventeen to eighteen days. With a good deal of fluctuation, these shipments of American summer fruits have been continued from year to year, and they show a gradual growth. Longer experience in handling has made it possible to deliver Californian peaches, pears, and plums in London in sound condition, almost without failure. The uncertain element from the commercial standpoint now is the condition of the English markets on arrival. If the markets are bare of English and French fruits, prices sufficiently high to leave a profit are obtained, otherwise not. With lower ocean transport and refrigeration rates a considerable increase could, it is held, be made with profit, as the fruit can now be placed on the London market within fifteen to seventeen days from the time of picking in California.

[*Year Book of the United States Department of Agriculture*, 1900.]

Wheat Production and Export of New South Wales.

Of recent agricultural developments in New South Wales the most noticeable is said to be the increased quantity of wheat produced, and the necessity of finding facilities for exporting the surplus. It is estimated that in 1899-1900 some 3,000,000 bushels were available beyond the requirements of the colony, and harvest prospects promised for the season of 1900-1901 a surplus of from 5,000,000 to 7,000,000 bushels beyond the quantity required for local consumption. To handle this surplus production in a systematic and economic manner is regarded as a problem needing immediate solution, for although the colony possesses an admirable railway system and water frontages scarcely equalled in the world, the two have never been brought into connection, so that the larger portion of the

exports has to be carted from the railhead to the store, and sometimes again from the store to the wharf, before a vessel can be loaded. Every such handling entails a charge of from ½d. to 1d. per bushel of wheat. Whether it will be decided to adopt the modern American system of handling wheat in bulk, by means of grain elevators and specially-fitted ships, or whether the system of handling it in bags, as at present, be allowed to continue, it is recognised that if New South Wales is to take a prominent place on European markets as a wheat exporter, some proper system of cleaning and grading must be adopted. At present the extent of land sown with wheat in New South Wales is about 1,476,000 acres, but the available area of land suitable for the production of this cereal in the colony is estimated at between 20,000,000 and 25,000,000 acres, which even under a rough and ready pioneer system of cultivation would produce an enormous quantity of grain for export if this should prove remunerative.

[*Agricultural Gazette of New South Wales.*]

REPORTS ON FOREIGN CROPS.

Crops in the United States.

The September report of the Statistician of the Department of Agriculture at Washington furnishes the following particulars as to the condition of the principal crops in the United States of September 1st, 1901.

The average condition of the entire wheat crop when harvested was 82·7 or 12·9 points higher than the average of last year, and 2·4 points above the ten years' average.

The general average condition of maize was 51·7 or 28·9 worse than at the corresponding date of last year and 8·3 points below the September average of 1881, which was the lowest previously recorded. Oats had an average condition of 72·1, as compared with 82·9 at the same date last year. Barley showed an average condition of 83·8, this being 13·1 points higher than that of last year. The acreage of clover seed has been reduced considerably since last year.

Crops in Russia.

The Board have received through the Foreign Office a memorandum, drawn up by Mr. H. Cooke from official sources, on the condition of the crops in the Russian Empire. The report is based upon data to hand at the end of July.

The harvest of winter sown grain is reported as good in the south-west, the central black soil zone, the north-west, some districts of the Baltic governments and Finland. The outlook is unsatisfactory in the south-east, some parts of the central governments, and the greater part of Poland. Elsewhere the winter grains promised an average crop.

The spring sowings are in worse condition than the winter grains. In the south-west, in Poland and part of the

north-west, the outlook is good; but it is unsatisfactory in the south-east (in a wide expanse of territory between the Dnieper and the Ural), east, and part of the Baltic governments.

The quality of the grain is said to be good, being of full enough weight and good colour; while even where the quantity is unsatisfactory the quality is said to be up to the average.

Generally speaking, therefore, it appears that the south and south-eastern provinces have this year suffered most, while the south-western governments, which suffered heavily last year, are among the regions yielding good or satisfactory crops this year. The harvest reports from Siberia are very unsatisfactory.

THE WHEAT HARVEST OF INDIA, 1900-1901.

According to the final general memorandum published by the Statistical Department of the Government of India, the results of the wheat harvest of 1900-1901 have not been all that was hoped for and expected, though the harvest exceeds the average. In the Panjab and in the North-Western Provinces the yield was considerably in excess of the decennial average, though the cultivator failed to obtain a return proportionate to the larger breadth of land placed under cultivation. In the Panjab the average was exceeded by as much as 45 per cent., and in the North-Western Provinces by 28 per cent. The yield in these provinces and Bengal represented a supply of about 5,435,000 tons, the decennial average having been 4,066,000 tons.

In the other wheat-growing regions the conditions were far less favourable. In the Central Provinces, and in Rajputana and Central India, the seasonal influences were felt as they were further north, but they operated on an area which was much below the average in consequence of the diversion of wheat lands to the growth of other grain required for the food of the people. Still worse were the conditions in Peninsular India—Bombay, Berar, the Nizam's Territory. In these tracts the monsoon rain was scanty, and at sowing time the land was so dry as, in many places, to

preclude the successful cultivation of wheat. But wheat in India is most largely grown in the Panjab and the North-Western Provinces, the area sown there in the present season being two-thirds of the whole; and the larger harvest from these tracts has so far compensated for the scanty returns elsewhere that the yield for India generally is estimated at about 6,583,000 tons, which is about 8½ per cent. more than the decennial average.

Following the disastrously bad crop of 1900 and the swift rise of prices which accompanied the failure, the exportation of wheat from India to other countries practically ceased, and indeed the quantity of wheat imported into India exceeded the quantity exported eleven-fold.

The estimated area and production in the various provinces are shown in the following table:—

Province.	Area.		Production.	
	(1900-01)	(1899-1900)	(1900-01)	(1899-1900)
	Acres.	Acres.	Tons.	Tons.
Panjab	8,766,400	6,366,500	2,940,602	1,823,182
North-Western Provinces and Oudh	5,294,850	4,794,451	1,987,000	1,950,814
Bengal	1,604,100	1,550,300	507,000	572,700
Central Provinces	2,018,290	1,633,070	432,440	201,803
Bombay	1,212,598	1,157,077	268,451	99,408
Sind	473,251	364,522	116,409	68,226
Berar	243,554	17,910	5,093	251
Nizam's Territory	748,163	419,633	14,833	1,979
Rajputana	713,290	360,733	170,682	79,289
Central India	864,782	515,600	139,910	71,821
Mysore	2,556	2,758	197	254
Total	21,941,834	17,182,554	6,582,617	4,869,727

CROPS IN ITALY.

The official reports published by the Ministry of Agriculture in the *Rivista Meteorico Agraria* up to the end of August stated that the results of the wheat harvest in Italy had shown the crop to be abundant, and of good quality. For maize and buckwheat the prospects in August were also on

the whole favourable. Vines promised a good yield of grapes, and little injury had been done by *Peronospora;* olives were doing well, particularly in Sicily.

CROPS AND LABOUR IN POLAND.

A report on the condition of crops in Poland and Lithuania has been received through the Foreign Office from H.M. Consul-General at Warsaw, who states that, in general, winter sowings were bad in Poland at the end of June last, while spring-sown crops were good.

The past winter and spring were very unfavourable for cereals, and the conditions appear to have been similar to those prevailing in Germany. Most of the area under winter corn had to be resown. In many cases farmers replanted the land with potatoes, but frequent rains in the early summer caused considerable damage. Concessions were made by the Land Bank to agriculturists on account of the adverse conditions. In Lithuania the position is very much better than in Poland.

The area sown to sugar-beet in Poland in 1901 is given as 160,000 acres, as compared with 144,000 in 1900. The great majority of the plantations belong to private persons, only 4,800 acres being owned by sugar factories, and this latter area, indeed, showed a decrease from the previous year.

Labour this year has been both plentiful and cheap throughout Poland. Some 200,000 labourers went, as usual, to Germany in March, but a very large proportion had to return, partly because a greater number than usual of Galician labourers had already gone to Germany, besides which the latter will take less pay. Work in factories and building operations in towns had also diminished, so that farm labourers were asking much lower rates than usual.

CROPS IN HUNGARY.

According to the reports received by the Hungarian Ministry of Agriculture up to the 10th August, the wheat

crop in Hungary is estimated to have yielded this year about 15,941,000 quarters, as compared with 16,912,000 quarters last year. The estimated yields of the other principal cereals are as follows:—Rye, 5,294,000 quarters, against 4,776,000 quarters in 1899; barley, 5,786,000 quarters, against 6,396,000 quarters; and oats 6,945,000 quarters against 7,319,000 quarters.

Potatoes were reported to be in good condition, and sugar-beet and other roots were also satisfactory.

CROPS IN AUSTRIA.

According to the official report for the middle of August, the rye harvest in Austria was nearly over, the yield being in most places a good average, though somewhat less in Galicia. The wheat had hardly come up to expectation; it appears on the whole to be described as not more than average. A similar condition prevailed with barley, of which the quality had suffered from rain. Oats were rather better than barley in some districts, but much the same in others. Maize, although it had suffered from rain in places, was on the whole above the average. Hay had proved fairly satisfactory only in Galicia and the Alps. Potatoes and beetroot, with few exceptions, were doing well.

CROPS IN NORWAY.

Reports received through the Foreign Office state that the hay crop may probably be estimated at considerably above the average throughout the east and south of Norway, as well as in the most northerly districts. On the west coast up to Stavanger the hay crop has also been good, but poorer to the north of this and in the neighbourhood of Trondhjem.

The corn and potato crops are expected to be under the average in most districts in Norway.

CROPS IN GERMANY.

According to the official report on the prospects of the crops in the middle of August, the condition was, on the whole, rather worse than in the middle of May; the following month had proved unfavourable, but there had subsequently been some slight improvement. The condition of wheat was poor, and rye was only average. In the case of winter corn the harvest was in many places over. Reports were satisfactory in the south, but the yield is small throughout North Germany. Of spring crops barley promised best, though apparently not much over average, but oats were more deficient.

Potatoes were reported to be the least unsatisfactory crop. Clover, lucerne, and meadows were under average on the whole.

THE WHEAT HARVEST OF SOUTH AUSTRALIA FOR 1900-1901.

The preliminary returns of the acreage and production of the South Australian wheat harvest, which have recently been published by the Government Statist of that colony, show that the area harvested in the present year was 1,574,017 acres, compared with 1,821,137 acres in 1899-1900, and the production was 11,253,148 bushels, or 2,800,013 bushels more than in the preceding year; the yield being at the rate of 7·15 bushels, as against 4·64 bushels per acre. There were also 341,330 acres of wheat which were cut for hay.

THE NEW ZEALAND HARVEST OF 1900-1901.

The Agricultural Department of New Zealand have published the final returns of the yield of grain from the recent harvest, and the figures relating to wheat and oats, together

with those of previous years are shown in the following table :—

Year.	Wheat.			Oats.		
	Area.	Yield per acre.	Production.	Area.	Yield per acre.	Production.
	Acres.	Bushels.	Bushels.	Acres.	Bushels.	Bushels.
1897-98	315,801	17.95	5 670,017	354,819	27.44	9,738.391
1898-99	399,034	32.76	13,073,416	417,320	39.56	16,511,388
1899-1900	269 749	31 81	8,581,898	398,243	40.99	16,325,832
1900-01	206,465	31 61	6,527,154	449,534	42 45	19,085,837

The quantity of wheat which the Department consider will be required for seed and for home consumption is 5,360,000 bushels, and after allowing for stocks on hand, the apparent surplus available for export was over 3¼ million bushels. Both the area and the yield of oats were above the figures for 1899-1900, and the total production showed an increase of about 2¾ million bushels. The yield of barley was 1,027,651 bushels, and of maize 502,697 bushels.

THE WHEAT HARVEST OF AUSTRALASIA IN 1899-1900.

The estimates of the acreage and yield of land under wheat in the various colonies of Australasia in 1899-1900 are shown in the following table, together with similar details for the previous season :—

Colony.	Area.		Produce.	
	1899-1900.	1898-99.	1899-1900.	1898-99.
	Acres.	Acres.	Bushels.	Bushels.
Victoria - - - -	2,165,693	2,154,163	15,237,948	19,581,304
New South Wales - -	1,426,166	1,319,503	13,604,166	9,286,216
Queensland - - -	52,527	46,219	614,414	607,012
South Australia - -	1,821,137	1,788,770	8,453,135	8,778,900
Western Australia - -	84,462	75,032	966,601	870,909
Tasmania - - -	64,328	85,287	1,101,303	2,303,512
New Zealand - - -	269,749	399,034	8,581,898	13,073,416
	5,834,062	5,868,008	48,559,465	54,501,269

The yield of wheat was on the average 8·25 bushels per acre in 1899-1900, as compared with 9·30 bushels in the earlier year. In Victoria the yield declined from 9 to 7 bushels, while that of New South Wales rose from 7 bushels to 9½ bushels; the yield in South Australia was 4·64 bushels against 4·90 bushels in 1898-99. Notwithstanding the remarkable decline in the area devoted to this crop in New Zealand, the yield of 32 bushels per acre placed this colony third in point of production. Tasmania, which produced 27 bushels in 1898-99, fell to 17 bushels in 1899-1900.

PARLIAMENTARY PUBLICATIONS.

Board of Agriculture.—Annual Repor of Proceedings under the Sale of Food and Drugs Acts, Merchandise Marks Acts, etc. [*Cd.* 654]. *Price 3d.*

This is the first occasion on which a report has been made on the proceedings of the Board under the enactments named above, and opportunity has been taken to describe in some detail the extent of the powers of the Board under these statutes.

With regard to the Sale of Food and Drugs Acts, in is observed that during the year 1900, in pursuance of arrangements made after consultation between the Board of Agriculture and the Board of Customs, 1,590 samples of imported articles of food were taken at the ports of entry, under Section 1 of the Act of 1899, and analysed at the Government Laboratory. In 26 instances the commodities thus sampled were reported adulterated, and fines were recovered from the importers in seven cases in which the circumstances, in the opinion of the Commissioners of Customs, warranted action of this nature.

The Board have made use of the inspectors on their regular staff to confer where necessary with the local authorities with the view of obtaining the widest possible acquaintance with the existing methods whereby the law on the subject of adulteration is being locally administered, and, at the same time, of supplying the responsible authorities engaged in the work with such advice and assistance as to the methods found most effective and satisfactory in the execution of the law as the Department was in a position to afford. During the year 1900 interviews and enquiries of this nature were held in 396 separate cases.

The registration of all premises of wholesale dealers in

margarine and margarine cheese as well as of the manufactories of these articles is required by the new Act, and during the year under review notifications were received by the Board of the registration of 2,229 separate premises in Great Britain, in the districts of 186 local authorities. Of these nearly 800 have been visited and the registers duly inspected, and the information thus available has already been found of service in the detection of offences.

With regard to the Merchandise Marks Act, correspondence on the subject of reported offences was conducted in several instances, but, after careful examination, it did not appear that proceedings could with advantage be instituted under the Act.

A statement is given in the Report of the number of samples taken under the Fertilisers and Feeding Stuffs Act in each year since 1894 for each county or borough in Great Britain. The number of samples of fertilisers taken in 1894 was 317. This number increased to 698 in 1898, but the total receded to 619 in 1900. As regards feeding stuffs, the latest totals are the greatest, and the increase has been—with a slight exception in 1899—continuous, the samples taken numbering 127 in 1894 and 355 in 1900. The total number of samples taken in accordance with the regulations of the Board averaged 975 in the past three years, against an annual average of 622 in the first three years during which the Act was in operation

During 1900 the number of counties and boroughs making use of the Act was 58, or five more than in 1899. It is remarked that there are still nine of the 51 English counties in which advantage has not yet been taken of the facilities provided by the Act, while in three of the 12 Welsh counties and eight of the 33 county areas in Scotland no samples have yet been taken.

The Report concludes with an account of the steps taken for the dissemination of information through the medium of special reports, the "Journal," and leaflets.

Ireland: Report of proceedings under the Diseases of Animals Acts for the year 1900. [*Cd.* 662]. *Price* 7*d.*

No cases of Pleuro-Pneumonia or Foot-and-Mouth Disease were reported during the year, and in the case of Swine Fever there was a substantial diminution in the number of outbreaks as compared with previous years. The number recorded was 233 as against 321 in 1899.

A further and very decided decrease took place in the number of Rabies outbreaks in Ireland, only 15 cases being reported, whereas the number in 1899 was 92 and in the preceding year 132. This decrease, it is observed, gives ground for hope that the preventive measures taken will result in a complete eradication of the disease at no very distant date.

Only two outbreaks of anthrax occurred, the same number as in each of the two preceding years. Glanders, of which 10 outbreaks were reported, was confined to Ulster.

Sheep scab received a good deal of attention throughout the year, and this disease was reported from 36 counties and county boroughs, 545 outbreaks being recorded, an increase of three on the previous year, and 7,144 animals were attacked. It is, however, feared that these figures do not indicate the full extent of the prevalence of the malady, as in all probability many sheep-owners either through apathy or wilful disregard of the obligations imposed on them, still fail to notify the occurrence of cases of the disease among their flocks.

Judicial Statistics.—England and Wales, 1899. *Part I.* [*Cd.* 659.] *Price* 2*s.* 3*d.*

Statistics relating to various non-indictable offences tried in Courts of Summary Jurisdiction are given in this publication, and among these offences it may be noted that proceedings for offences under the Sale of Food and Drugs Acts were taken against 3,527 persons in 1899, and in 2,923 cases

a fine was imposed, while in one case the defendant was sentenced to imprisonment. The number of prosecutions for offences of this character, which has steadily increased during the past twenty years, showed a further rise in 1899; in the five years 1879-83 the annual average number was 1,371, while in 1895-99 it was 3,104 per annum. In the three Welsh counties of Brecon, Merioneth, and Radnor no prosecutions took place. The greatest number of prosecutions were recorded in London, viz., 1,215; in Lancashire they numbered 415; in the West Riding of Yorks, 190; in Middlesex, 174; in Essex, 135; in Warwick, 134; in Stafford, 117; and in Glamorgan, 105.

Among other cases it may be observed that there were 3,625 prosecutions for offences against the Diseases of Animals Acts, in 2,870 of which fines were imposed. The average for the five years 1894-98 was 2,846. Prosecutions for offences relating to dogs are shown separately, and amounted to 27,734, which was much below the number in 1898, when the cases relating to dogs numbered 43,210. Fines were imposed in 24,983 cases.

Local Authorities in Scotland (Technical Education), Returns for 1899-1900. [*H.C.* 140]. *Price 6d.*

This return shows the extent to which, and the manner in which, local authorities in Scotland have allocated and applied funds to the purposes of technical education in the year ended 15th day of May, 1900, under the following Acts: Local Taxation (Customs and Excise) Act, 1890; Education and Local Taxation Account (Scotland) Act, 1892; Technical Schools (Scotland) Act, 1887; Technical Instruction Amendment (Scotland) Act, 1892; and Public Libraries Acts.

The total amount of the residue grant paid to the county councils, town councils of burghs, and commissioners of police burghs in respect of the year 1898-99 was £71,192, of which £53,833 was allocated for purposes of technical

education, and £17,359 was devoted to relief of rates. It appears that 26 out of the 33 county councils applied the whole of the grant to technical education, and 4 a part of it, while 3 applied the grant wholly to relief of rates. Of the 206 burghs and police burghs, 53 applied the whole and 73 a part of the residue grant to technical education; 80 applied the whole to relief of rates. No amount has been applied to the building or maintenance of science and art schools, art galleries, or museums out of the local rate under the Public Libraries Acts. The total amount available for purposes of technical education during the year 1899-1900, including balance in hand, contributions under section 2 (5), c, of the Education and Local Taxation Account (Scotland) Act, 1892, bank interest, etc., was £72,527, and the total amount expended was £54,136, of which £13,937 was handed over to secondary education committees.

Committee on Botanical Work: Report of the Departmenta Committee on Botanical Work and Collections at the British Museum and at Kew. *H.C.* 205. [*Price* 2s.]

This Committee was appointed to consider the arrangements under which botanical work is done and collections maintained at the British Museum and at Kew, and whether any changes were desirable to avoid duplication. The Committee recommend that the whole of the botanic collections at the British Museum, with the exception of the collections exhibited to the public, should be transferred to Kew, and that an advisory board should be appointed whose members should be nominated by the Crown, the British Museum, Colonial Office, Foreign Office, India Office, and the Royal Society, to advise on all questions of a scientific nature arising out of the administration of Kew Gardens. The Committee further recommended that the illustrative botanical collections now publicly exhibited at the British Museum be maintained, and so far as it is possible and

expedient enlarged and developed with the view of increasing popular interest and imparting popular instruction concerning the phenomena of the vegetable world.

Report on the Progress of the Ordnance Survey to the 31st March, 1901. [*Cd.* 709.] *Price*, 4*s*. 3*d*.

The revision of the Cadastral Survey of England and Wales on the $\frac{1}{2500}$ scale, which was begun in 1894, has now been taken up in all the counties of England and Wales which were surveyed more than twenty years ago.

The revision of the following counties is still in progress—viz., Cambridge, Cardigan, Dorset, Gloucester, Montgomery, Salop, Stafford, Worcester and York (West Riding), while the revision of the following counties has been completed :—Anglesey, Bedford, Berks, Bucks, Carnarvon, Chester, Cumberland, Denbigh, Derby, Durham, Essex, Flint, Glamorgan, Hants, Hertford, Hunts, Kent, London, Merioneth, Middlesex, Monmouth, Northampton, Northumberland, Notts, Oxford, Surrey, Sussex, Westmorland, Wilts. Maps on the scale of six inches to a mile, reduced from the $\frac{1}{2500}$ scale, are published as the revision proceeds. With regard to the maps on the one inch scale, the whole of England and Wales has been revised on the ground since 1893, and the maps have been engraved and published. The general result obtained by the revision is that there is now, for the first time, available to the public a one inch outline map prepared on one uniform system and with its principal details nearly up to date. The issue of this map in colour is being proceeded with, and is nearly completed for the South of England and Wales. It has been commenced in the North of England. The engraving of the maps on the scale of four miles to an inch is in progress, and it is proposed to publish cheap county maps on this scale with the main roads coloured, to be sold at 6d. each, or 9d. if folded in a cover.

The revision of the Cadastral Survey of Scotland on the $\frac{1}{2500}$ scale was begun in 1894, and has been completed for

Argyll, Ayr, Berwick, Bute, Clackmannan, Dumbarton, Dumfries, Lanark, Linlithgow, Orkney, Peebles, Perth, Renfrew, Roxburgh, Selkirk, Shetland, and Stirling, and is in progress in Aberdeen, Forfar, and Inverness. The publication of the revised one inch maps of Scotland, with the hills printed in brown, has been completed, except in the Western Islands. The engraving of the map on the scale of four miles to an inch is in progress, and 29,038 square miles had been engraved up to March last, and publication will commence shortly.

With regard to the re-survey of Ireland, the Director-General states in the report that 10,475 square miles on the $\frac{1}{2500}$ scale have been surveyed, of which 7,364 square miles have been published. The work has been delayed by the extreme closeness of the detail, but arrangements have now been made for a considerable augmentation of the staff, and the transfer of two divisions from Great Britain to Ireland.

The net value of the Ordnance Survey maps sold in 1900-1901 was £23,584, while the value of maps presented to public departments, etc., amounted to £19,072.

Tenth Report of the Congested Districts Board for Ireland. [*Cd.* 681.] *Price,* 1*s.* 2½*d.*

In connection with their work for the improvement of agriculture in the congested districts of Ireland, the Board maintained, as usual, a large number of experimental and demonstration plots in various districts. In 1900-1901 these included 100 plots for testing the suitability of different artificial manures as top dressings for grass land; 106 plots to demonstrate the advantage to be derived from laying down land with good grass and clover seeds; seventy-five plots for testing the relative merits of different varieties of potatoes; three plots for testing mixtures for the prevention of smut in oats; and seven plots to encourage the culture of strawberries. In addition, small quantities of vegetable

seeds were furnished to about 250 cottagers to encourage the cultivation of vegetables; fruit trees were also distributed at a low charge, and small numbers of forest trees were supplied gratis.

The Board provided twenty-six stallions, standing in different districts, and the average number of mares served by each horse was sixty-four. There were also twenty-four asses located for service in congested districts. Owing to the marked scarcity of the old type of pony found in Connemara and in the barony of Erris, the Board have purchased thirteen mares, which have been crossed with a high-class Arab stallion. From this experiment it is hoped that an improved Connemara pony will become available and will help to maintain the supply of pony mares. During the year 131 bulls were sold under the system of three annual instalments, bringing up to 270 the total number held and not yet fully paid for under this arrangement. Sixteen Cheviot and forty-nine black-faced rams and thirty-four boars of the large Yorkshire breed were also sold by the Board on easy terms of purchase.

The Board distributed 130,535 eggs for hatching during the season at 1d. each, but the price is to be reduced to ½d. per egg in the present season; 473 head of poultry, including 159 ducks and twelve turkeys, were also purchased and distributed. The number of hives and beekeepers' outfits sold by the Board, viz., 246, exceeded that of any previous year. Considerable attention has now been devoted to the encouragement of local associations of beekeepers, and it may be said that almost every locality in the congested districts, in which there is any considerable number of beekeepers working upon the improved system with wooden hives, has now its own association.

PRICES OF LIVE STOCK.

Returned Under the Weighing of Cattle Act.

The number of cattle returned as entering the markets at the places scheduled under the Markets and Fairs (Weighing of Cattle) Act, 1891, during the second quarter of the year 1901 was 300,579, or slightly less than in the corresponding quarter of 1900. The supply of sheep was almost precisely the same, but the number of swine exposed for sale showed a marked reduction.

Animals.	2nd Quarter, 1901.	2nd Quarter, 1900.
Cattle :	No.	No.
Entering markets - - - - - -	300,579	309,384
Weighed - - - - - - - -	36,384	34,806
Prices returned - - - - - -	32,848	31,684
Prices returned with quality distinguished -	26,535	25,709
Sheep :		
Entering markets - - - - - -	1,145,699	1,145,266
Weighed - - - - - - - -	14,396	10,802
Prices returned with quality distinguished -	10,591	8,392
Swine :		
Entering markets - - - - - -	88,238	103,473
Weighed - - - - - - - -	652	721
Prices returned with quality distinguished -	646	717

The proportion of animals weighed, and also of those for which prices as well as weights were returned, shows a general, though slight, increase, and, as regards cattle, is larger than in any previous second quarter of the year. At Birmingham, Bristol, and York the weighbridge appears to have remained unused during the three months, and, although a certain number of cattle were weighed at Ash-

ford, Norwich, and Salford, no particulars of the prices which they realised were furnished.

From thirteen of the twenty-one scheduled places sufficient information is forthcoming to enable a record of the prices of fat cattle to be calculated, although in two instances, Leicester and Perth, the returns are seriously defective. The average at each of the markets thus selected appears to have been, in the three months under review, as shown in the following statement:—

Places.	Inferior or Third Quality.			Good or Second Quality.			Prime or First Quality.		
	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.
		s. d.	s. d.		s. d.	s. d.		s. d.	s. d.
Carlisle	411	3 4½	27 0	681	3 11½	31 8	1,083	4 4½	35 0
Leicester	—	—	—	28	3 9	30 0	110	4 4½	35 0
Leeds	13	3 6	28 0	106	3 8¾	29 10	411	4 3	34 0
Liverpool	119	3 3¾	26 6	105	3 10	30 8	496	4 4¼	34 10
London	—	—	—	389	4 3	34 0	882	4 8¼	37 6
Newcastle	—	—	—	110	4 1	32 8	1,015	4 6¼	36 2
Shrewsbury	145	3 10	30 8	380	4 3	34 0	116	4 5¾	35 10
Aberdeen	1,361	3 3½	26 4	1,548	4 3	34 0	2,238	4 6¼	36 2
Dundee	479	3 4¼	26 10	1,679	4 3¼	34 2	720	4 6½	36 4
Edinburgh	—	—	—	3,443	4 5	35 4	171	4 7	36 8
Falkirk	135	4 2¾	33 10	359	4 5½	35 8	274	4 7¾	37 2
Glasgow	341	4 4	34 8	586	4 4¾	35 2	1,969	4 6¼	36 2
Perth	—	—	—	164	4 5½	35 8	162	4 8¼	37 6

London and Perth would appear to have returned the highest price (37s. 6d. per cwt., or 4s. 8¼d. per stone) for prime quality cattle, the lowest (34s. per cwt., or 4s. 3d. per stone) being recorded for Leeds. In the category of second quality cattle, Perth and Falkirk furnish a quotation of 35s. 8d. per cwt. (4s. 5½d. per stone), the price at Leeds being again lowest with 29s. 10d. per cwt. (3s. 8¾d. per stone). The information as regards the inferior grade is imperfect in detail.

Comparing the prices above-mentioned with those returned for the corresponding quarter of last year, the following results appear:—

PLACES.	INFERIOR or Third Quality.		GOOD or Second Quality.		PRIME or First Quality.	
	1901.	1900.	1901.	1900.	1901.	1900.
	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.
Carlisle - -	27 0	27 4	31 8	31 2	35 0	35 6
Leicester - -	—	—	30 0	30 4	35 0	34 8
Leeds - - -	28 0	28 0	29 10	28 10	34 0	34 4
Liverpool - -	26 6	26 8	30 8	29 4	34 10	36 0
London - -	—	26 0	34 0	35 2	37 6	39 10
Newcastle - -	—	—	32 8	36 8	36 2	39 2
Shrewsbury -	30 8	29 6	34 0	33 10	35 10	37 6
Aberdeen - -	26 4	28 0	34 0	34 6	36 2	37 10
Dundee - -	26 10	26 8	34 2	35 0	36 4	37 6
Edinburgh - -	—	—	35 4	37 2	36 8	38 6
Falkirk - -	33 10	29 10	35 8	35 10	37 2	38 6
Glasgow - -	34 8	32 8	35 2	34 8	36 2	37 8
Perth - - -	—	—	35 8	36 10	37 6	38 10

It will be seen that, with few exceptions, a general tendency to lower values is shown, and the course of trade, as a whole, is indicated in the following calculation of average values for each month of the current and immediately preceding year, compiled from the returns received from all the places set out in the foregoing tables.

Months.	Good, or Second Quality. Per cwt.		Prime, or First Quality. Per cwt.	
	1901.	1900.	1901.	1900.
	s. d.	s. d.	s. d.	s. d.
January - - -	34 8	34 8	36 2	37 2
February - - -	34 6	34 6	35 10	36 8
March - - -	34 2	34 2	36 0	36 0
April - - - -	34 2	33 8	36 0	35 10
May - - - -	34 2	35 6	36 0	37 4
June - - - -	34 8	37 6	36 4	39 2

The prices of both first and second qualities of fat cattle, which were in March last at the same level as in the preceding year, and in April had risen slightly above that figure, fell in May and June as compared with last year, the reduction in the latter month being nearly 3s. per cwt.

Sales of fat cattle by live weight, *i.e.*, at an agreed rate per stone or per cwt., were reported from eight of the scheduled places, viz., Glasgow, Dundee, London, Edinburgh, Wakefield, Liverpool, Falkirk, and Leicester, but the transactions so recorded were very limited in number at the three last named places.

At Shrewsbury, the practice of weighing store cattle still prevails to a considerable extent, no less than 3,571 being returned, with the prices realised, during the quarter. Edinburgh, Aberdeen, Dundee, and Leicester were the only other places in the list where the weighbridge appears to have been resorted to in connection with the sale of store cattle in these three months.

The appended table gives the usual details for each of the scheduled places :—

CATTLE, SHEEP, and SWINE *entering the Markets and Marts of the undermentioned Places, with the Number Weighed, as received from the Market Authorities in the* SECOND QUARTER *of* **1901**, *under the Markets and Fairs (Weighing of Cattle) Act,* 1891 (54 & 55 *Vict. c.* 70).

PLACES.	Cattle. Total Number entering the Markets or Marts.	Cattle. Number Weighed.	Cattle. Number Weigh'd for which Prices were given.	Sheep. Total Number entering the Markets or Marts.	Sheep. Number Weighed.	Sheep. Number Weigh'd for which Prices were given.	Swine. Total Number entering the Markets or Marts.	Swine. Number Weighed.	Swine. Number Weigh'd for which Prices were given.
ENGLAND.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Ashford	3,006	30	—	27,642	—	—	4,605	—	—
Birmingham	8,319	—	—	22,385	—	—	39,660	—	—
Bristol	7,396	—	—	32,178	—	—	—	—	—
Carlisle	18,624	2,175	2,175	69,986	—	—	3,220	—	—
Leicester	16,953	186	165	17,844	—	—	1,405	—	—
Leeds	8,719	530	530	38,900	2,822	2,822	388	—	—
Lincoln	3,195	—	—	23,077	—	—	2,849	20	20
Liverpool	7,227	720	720	91,357	1,490	1,490	—	—	—
London	14,105	3,114	1,271	153,670	3,671	68	310	—	—
Newcastle-upon-Tyne	24,169	1,125	1,125	88,276	—	—	8,905	560	560
Norwich	31,517	72	—	51,309	—	—	3,991	—	—
Salford	22,326	554	—	159,191	—	—	526	—	—
Shrewsbury	17,035	4,258	4,212	18,943	—	—	7,165	6	—
Wakefield	17,536	1,214	385	60,745	110	—	3,298	—	—
York	28,708	—	—	32,673	—	—	493	—	—
SCOTLAND.									
Aberdeen	11,712	5,229	5,229	54,453	5,240	5,240	3,706	—	—
Dundee	5,018	2,915	2,915	6,777	493	493	772	—	—
Edinburgh	17,670	7,551	*3,818	62,995	—	—	2,187	—	—
Falkirk	3,063	768	768	2,032	—	—	33	—	—
Glasgow	14,620	3,037	2,896	66,395	275	183	1,404	—	—
Perth	19,661	2,906	*326	64,871	295	295	3,321	66	66
TOTAL for ENGLAND	228,835	13,978	10,583	888,176	8,093	4,380	76,815	586	580
TOTAL for SCOTLAND	71,744	22,406	*15,952	257,523	6,303	6,211	11,423	66	66
Total	300,579	36,384	*26,535	1,145,699	14,396	10,591	88,238	652	646

* Prices for 3,733 cattle in addition to the above were quoted from Edinburgh and for 2,580 cattle from Perth, but without distinguishing the quality.

PRICES OF MEAT, CORN, AND DAIRY PRODUCE.

AVERAGE PRICES of DEAD MEAT, per 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the Second Quarter of 1901, and during the Months of June, July, and August, 1901.

(*Compiled from the prices quoted weekly in the Meat Trades' Journal.*)

DESCRIPTION.	2ND QUARTER 1901.	JUNE 1901.	JULY 1901.	AUGUST 1901.
BEEF :—	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
Scotch, short sides	4 2 to 4 5	4 3 to 4 7	4 4 to 4 7	4 3 to 4 6
,, long sides	3 11 ,, 4 2	4 0 ,, 4 2	— ,, —	— ,, —
English	3 9 ,, 3 11	3 10 ,, 4 0	3 9 ,, 3 11	3 9 ,, 3 10
Cows and Bulls	2 0 ,, 3 2	2 1 ,, 3 3	1 11 ,, 3 3	2 0 ,, 3 1
American Birkenhead killed	3 6 ,, 3 8	3 6 ,, 3 8	3 6 ,, 3 8	3 7 ,, 3 8
,, Deptford killed	3 7 ,, 3 9	3 6 ,, 3 9	3 7 ,, 3 10	3 7 ,, 3 9
American Refrig. hind-quarters	3 7 ,, 3 9	3 9 ,, 3 11	3 6 ,, 3 9	3 9 ,, 4 0
,, ,, fore-quarters	2 4 ,, 2 6	2 2 ,, 2 4	1 11 ,, 2 2	2 1 ,, 2 3
Australian, Frozen hind-quarters	2 3 ,, 2 4	2 3 ,, 2 4	2 3 ,, 2 5	2 4 ,, 2 5
,, ,, fore-quarters	1 10 ,, —	1 5 ,, 1 7	1 4 ,, 1 5	1 4 ,, —
New Zealand ,, hind-quarters	2 5 ,, 2 6	2 4 ,, 2 6	2 6 ,, 2 7	2 6 ,, 2 7
,, ,, fore-quarters	1 7 ,, 2 0	1 7 ,, 1 8	1 6 ,, —	1 6 ,, —
River Plate ,, hind-quarters	2 5 ,, —	2 6 ,, —	2 6 ,, 2 7	2 5 ,, 2 6
,, ,, fore-quarters	2 0 ,, 2 2	1 8 ,, —	1 6 ,, 1 7	1 6 ,, —
MUTTON :—				
Scotch, Prime	4 8 ,, 5 1	4 8 ,, 5 1	4 6 ,, 4 11	4 4 ,, 4 8
English, Prime	4 4 ,, 4 9	4 2 ,, 4 8	4 1 ,, 4 8	4 0 ,, 4 6
Ewes	3 5 ,, 3 10	3 3 ,, 3 9	3 3 ,, 3 7	3 4 ,, 3 7
Continental	4 2 ,, 4 6	4 0 ,, 4 4	4 0 ,, 4 6	3 10 ,, 4 3
New Zealand, Frozen	1 10 ,, 2 10	1 6 ,, 2 9	1 7 ,, 2 9	2 2 ,, 2 7
Australian, Frozen	1 7 ,, 1 9	1 5 ,, 1 7	1 7 ,, 1 10	1 11 ,, 2 0
River Plate, Frozen	1 8 ,, 1 11	1 6 ,, 1 8	1 9 ,, —	1 10 ,, 2 0
LAMB :—				
English	6 0 ,, 7 2	5 4 ,, 6 6	4 10 ,, 5 9	4 5 ,, 5 4
New Zealand, Frozen	3 4 ,, 3 9	3 3 ,, 3 8	3 3 ,, 3 8	3 1 ,, 3 6
VEAL :—				
English	4 6 ,, 4 10	4 5 ,, 4 9	4 4 ,, 4 7	4 4 ,, 4 8
Foreign	3 7 ,, 4 4	3 5 ,, 4 3	3 4 ,, 4 2	3 3 ,, 4 2
PORK :—				
English, best	4 1 ,, 4 6	4 0 ,, 4 4	4 0 ,, 4 4	4 0 ,, 4 5
,, secondary / Foreign	3 6 ,, 3 11	3 6 ,, 3 10	3 4 ,, 3 9	3 4 ,, 3 9

AVERAGE WHOLESALE PRICES of CATTLE and SHEEP, per 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during the under-mentioned Quarters of 1900 and 1901.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
2nd Quarter, 1900	3 1	4 1	4 9	3 5	5 7	6 4
3rd Quarter, ,,	3 2	4 3	4 11	3 3	5 4	6 0
4th Quarter, ,,	2 11	4 2	4 10	3 2	5 1	5 10
1st Quarter, 1901	2 4	3 11	4 7	3 4	5 2	6 0
2nd Quarter, ,,	2 4	3 11	4 6	3 3	4 9	5 7

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during the under-mentioned Quarters of 1900 and 1901.

PERIOD.	LIVERPOOL.*		GLASGOW.†	
	BEEF.	MUTTON.	BEEF.	MUTTON.
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
2nd Quarter, 1900	2 10 to 4 2	4 0 to 5 8	3 6 to 4 0	4 10 to 5 10
3rd Quarter. ,,	2 8 ,, 4 0	3 4 ,, 5 0	3 0 ,, 3 10	4 0 ,, 4 10
4th Quarter, ,,	2 8 ,, 3 10	3 0 ,, 4 10	3 0 ,, 3 10	3 0 ,, 4 8
1st Quarter, 1901	2 8 ,, 3 11	3 6 ,, 5 4	3 0 ,, 3 10	4 4 ,, 5 4
2nd Quarter, ,,	2 10 ,, 3 8	4 8 ,, 5 8	3 4 ,, 3 10	4 2 ,, 5 2

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals *slaughtered at the Liverpool Abattoir*, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE and SHEEP (First Quality), per cwt., Dead Weight in the BERLIN CATTLE MARKET in the undermentioned Months of 1901.

MONTHS.	CATTLE. Per Cwt.	SHEEP. Per Cwt.
1901.	*s.* *d.* *s.* *d.*	*s.* *d.* *s.* *d.*
June - - - - - - -	61 6 to 65 7	64 2 to 67 2
July - - - - - - -	62 1 „ 66 5	63 11 „ 66 11
August - - - - - -	63 4 „ 67 2	65 9 „ 68 10

NOTE.—The above prices have been compiled from the weekly returns published in the *Deutsche Landwirtschaftliche Presse.*

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality), per cwt., in the PARIS CATTLE MARKET in the undermentioned Months of 1901.

MONTHS.	OXEN. Per Cwt.	CALVES. Per Cwt.	SHEEP. Per Cwt.	PIGS. Per Cwt.
		LIVE WEIGHT.		
1901.	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
June - - - - -	30 10	45 0	34 5	36 10
July - - - - -	29 8	44 7	35 10	37 10
August - - - -	29 11	41 7	36 1	38 11
		DEAD WEIGHT.		
1901.	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
June - - - - -	51 4	75 4	68 10	52 11
July - - - - -	49 8	74 7	69 10	54 2
August - - - -	50 2	69 6	70 8	53 11

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique.*

CHICAGO.

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1901.

Month.	Good Dressed Beef and Shipping Steers.			Export Cattle.			Extra Prime Cattle.		
1901.	s. d.		s. d.	s. d.		s. d.	s. d.		s. d.
June - - -	24 6	to	26 6	24 10	,,	28 0	28 8	,,	29 8
July - - -	22 11	,,	25 11	23 1	,,	27 7	28 2	,,	29 1
August - -	23 5	,,	26 8	23 1	,,	28 0	28 7	,,	29 9

Compiled from the Live Stock Reports issued by Messrs. Clay, Robinson, and Co., of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in the under-mentioned Quarters of 1900 and 1901.

(*Computed from the Trade and Navigation Accounts.*)

PERIOD.	BEEF.		MUTTON.	PORK.		BACON.	HAMS.
	Fresh.	Salted.	Fresh.	Fresh.	Salted.		
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
2nd Quarter, 1900	40 1	26 11	36 3	43 0	24 8	41 6	46 7
3rd Quarter, ,, -	39 1	25 10	34 6	42 1	22 10	43 7	47 10
4th Quarter, ,, -	39 7	26 1	36 4	43 7	25 2	44 10	47 5
1st Quarter, 1901 -	40 9	25 8	37 9	43 2	27 10	45 1	46 8
2nd Quarter, ,, -	39 5	25 10	36 6	43 8	25 7	47 3	47 7

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1901, 1900, and 1899.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1901.	1900.	1899.	1901.	1900.	1899.
Wheat.						
	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
Lady Day	26 3	25 11	26 3	744,018	868,378	868,579
Midsummer	27 1	25 9	25 1	547,737	854,497	994,293
Michaelmas	—	28 7	25 2	—	511,347	754,667
Christmas	—	27 4	26 4	—	689,261	913,421
Barley.						
	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
Lady Day	25 3	25 1	27 1	844,616	888,949	830,398
Midsummer	24 9	24 3	24 6	53,408	93,157	92,648
Michaelmas	—	24 5	24 4	—	143,552	237,935
Christmas	—	25 11	26 6	—	2,065,135	2,135,762
Oats.						
	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
Lady Day	17 6	16 7	16 11	236,316	246,949	251,841
Midsummer	19 3	18 2	17 6	81,172	110,163	137,834
Michaelmas	—	18 7	17 3	—	116,880	147,902
Christmas	—	17 0	16 4	—	237,791	238,783

* Section 8 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local inspector of Corn Returns in any other measure than the imperial bushel or by weight or by a weighed measure, that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 39 imperial pounds for every bushel of oats.

CORN PRICES:—HARVEST YEAR.

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Weekly Averages of Corn Returns, together with the QUANTITIES returned as sold at the Returning Markets during each of the Harvest Years ending 31st August 1890 to 1901.

HARVEST YEARS.	PRICES.			QUANTITIES.		
	Wheat.	Barley.	Oats.	Wheat.	Barley.	Oats.
	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
1889-90	31 2	28 10	18 6	3,289,806	3,281,141	558,053
1890-91	35 5	28 0	19 1	3,496,788	3,659,382	602,887
1891-92	33 4	27 2	20 8	3,267,038	3,260,327	488,830
1892-93	26 8	24 10	18 9	2,676,227	3,383,094	547,412
1893-94	25 5	26 5	18 4	2,087,062	2,876,977	542,425
1894-95	21 5	21 5	14 8	2,180,959	3,136,415	693,121
1895-96	24 10	22 4	14 1	1,640,943	3,366,364	672,547
1896-97	28 8	23 2	16 9	2,597,268	3,200,612	551,912
1897-98	36 2	26 11	18 3	2,534,224	3,339,842	599,666
1898-99	26 0	26 1	17 3	3,498,515	3,629,760	777,676
1899-00	26 4	25 2	17 4	3,255,654	3,355,241	722,859
1900-01	27 1	25 0	18 1	2,463,341	3,109,149	684,956

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1901, and in the corresponding Weeks in 1900 and 1899.

Weeks ended (*in* 1901).	Wheat.			Barley.			Oats.		
	1901.	1900.	1899.	1901.	1900.	1899.	1901.	1900.	1899.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Jan. 5 -	26 5	25 9	27 0	25 4	25 7	28 3	17 2	16 2	17 0
,, 12 -	26 7	25 11	27 2	25 6	25 5	28 2	17 3	16 3	17 1
,, 19 -	26 11	26 0	27 0	25 9	25 8	27 11	17 3	16 2	17 1
,, 26 -	26 10	25 10	26 7	25 6	25 9	27 9	17 6	16 4	17 9
Feb. 2 -	26 7	25 8	26 6	25 7	25 4	27 2	17 8	16 6	17 0
,, 9 -	26 8	25 10	26 8	25 7	25 3	27 2	17 7	16 5	17 0
,, 16 -	26 4	26 1	26 0	25 4	24 11	26 10	17 7	16 8	16 11
,, 23 -	26 1	26 3	25 7	25 0	25 1	26 7	17 7	16 9	16 11
Mar. 2 -	25 11	26 4	25 8	25 0	24 6	26 7	17 9	16 10	17 0
,, 9 -	25 9	25 11	25 10	25 4	24 8	26 7	17 7	16 11	16 11
,, 16 -	25 9	25 10	25 10	25 1	24 6	26 3	17 7	16 11	16 10
,, 23 -	25 8	25 11	25 4	24 11	25 0	26 8	17 9	17 1	17 0
,, 30 -	26 0	25 10	24 11	24 9	24 11	26 2	18 0	17 2	16 11
Apl. 6 -	26 3	25 10	24 7	25 3	24 10	25 1	18 0	17 2	16 11
,, 13 -	26 5	25 11	24 6	26 0	24 5	25 7	18 1	17 8	16 10
,, 20 -	26 8	26 0	24 8	25 7	24 9	25 2	18 8	17 3	17 1
,, 27 -	26 8	26 0	25 0	25 8	25 2	25 10	18 8	17 11	17 5
May 4 -	26 9	25 11	25 3	26 4	25 3	24 5	19 1	18 0	17 6
,, 11 -	27 3	25 11	25 4	26 2	24 10	23 11	19 1	17 11	17 9
,, 18 -	27 7	25 7	25 3	24 2	24 5	23 11	19 4	18 5	17 10
,, 25 -	27 7	25 5	25 2	24 1	23 11	23 8	19 8	18 2	17 8
June 1 -	27 7	25 5	25 4	23 8	24 4	24 4	19 9	18 6	18 1
,, 8 -	27 6	25 3	25 6	22 9	23 8	21 10	20 1	18 8	18 2
,, 15 -	27 8	25 6	25 7	24 0	23 8	23 1	19 7	18 11	17 10
,, 22 -	27 6	25 9	25 7	23 2	23 5	26 2	20 3	18 11	17 11
,, 29 -	27 6	26 11	25 7	25 4	23 4	24 2	20 0	19 3	18 0
July 6 -	27 8	27 10	25 7	21 9	22 10	21 9	19 10	19 5	18 1
,, 13 -	27 2	28 7	25 5	23 10	23 2	20 4	19 9	19 1	17 11
,, 20 -	27 3	29 0	25 5	23 4	23 8	21 10	19 11	19 3	18 0
,, 27 -	27 3	29 3	25 2	22 1	24 4	22 5	19 4	19 9	18 2
Aug. 3 -	27 6	28 10	24 10	23 1	23 10	20 9	20 0	19 4	18 0
,, 10 -	27 7	28 7	24 8	22 1	23 7	22 6	19 4	19 8	17 9
,, 17 -	27 4	28 10	24 7	27 2	23 3	26 11	18 9	19 11	17 4
,, 24 -	27 3	28 10	24 7	23 7	24 10	26 5	18 1	18 8	17 1
,, 31 -	27 0	28 8	25 0	24 3	25 2	25 10	17 10	18 1	16 7
Sept. 7 -	26 5	28 7	25 5	25 1	25 8	26 5	17 6	17 10	16 6
,, 14 -	26 2	28 4	25 4	24 11	25 4	27 1	17 4	17 1	16 2
,, 21 -		28 4	25 4		26 0	27 4		17 1	16 1
,, 28 -		28 9	25 6		26 1	26 11		17 2	16 5
Oct. 5 -		28 9	26 0		26 2	28 0		16 10	16 5
,, 12 -		28 9	27 3		26 2	27 9		17 1	16 5
,, 19 -		28 4	28 2		26 5	27 6		16 11	16 10
,, 26 -		27 11	28 1		26 3	27 4		16 11	16 3
Nov. 2 -		27 5	27 2		26 3	27 2		16 11	16 7
,, 9 -		27 3	26 7		25 11	26 9		16 10	16 5
,, 16 -		27 1	26 1		25 8	26 4		17 1	16 7
,, 23 -		27 2	25 8		25 10	26 2		17 0	16 7
,, 30 -		27 0	25 7		25 9	25 10		17 2	16 6
Dec. 7 -		26 10	25 7		25 11	25 10		17 4	16 5
,, 14 -		26 9	25 4		25 7	25 7		17 1	16 1
,, 21 -		26 7	25 6		25 7	25 10		17 2	16 0
,, 28 -		26 4	25 9		25 10	25 5		17 2	16 2

AVERAGE PRICES of WHEAT, BARLEY, and OATS, per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1901.

Month.	Wheat.		Barley.		Oats.	
1901.	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
May - - - - - -	29	4	23	0	19	8
June - - - - - -	29	10	23	2	20	1
July - - - - - -	29	6	21	10	20	6

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge.*

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES, in the under-mentioned Months of 1901.

MONTH.	FRANCE.		ENGLAND.	
WHEAT.				
1901.	Per Qr. *s.*	*d.*	Per Qr. *s.*	*d.*
June - - - - - - -	33	2	27	6
July - - - - - - -	33	6	27	4
August - - - - -	35	0	27	4
BARLEY.				
1901.	Per Qr. *s.*	*d.*	Per Qr. *s.*	*d.*
June - - - - - - -	23	1	23	9
July - - - - - - -	23	0	22	9
August - - - - - - -	23	1	24	0
OATS.				
1901.	Per Qr. *s.*	*d.*	Per Qr. *s.*	*d.*
June - - - - - - -	21	10	19	11
July - - - - - - -	22	3	19	8
August - - - - - - -	22	2	18	9

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique.* The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER at the under-mentioned Markets in the under-mentioned Months of 1901.

Month.	London.	Paris.	Breslau.
	WHEAT.		
1901.	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d. s. d.
June - - - - - -	28 4	34 6	35 10 to 39 7
July - - - - - -	27 3	35 0	34 8 ,, 38 2
August - - - - - -	28 2	37 7	35 10 ,, 39 7
	BARLEY.		
1901.	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d. s. d.
June - - - - - -	24 3	22 4	24 8 to 27 11
July - - - - - -	—	22 7	24 1 ,, 27 4
August - - - - - -	24 1	22 7	24 0 ,, 27 3
	OATS.		
1901.	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d. s. d.
June - - - - - -	19 11	22 11	20 2 to 20 11
July - - - - - -	19 11	23 10	20 1 ,, 20 10
August - - - - - -	19 0	23 10	19 5 ,, 21 0

Note.—The London quotation represents the price of British corn as returned under the Corn Returns Act, 1882; the price of grain in Paris is the official average price of French grain in that city; the quotations shown for Breslau represent the prices of grain of good merchantable quality.

PRICES OF WOOL.

AVERAGE PRICES of ENGLISH WOOL, per pack of 240 lbs., in the under-mentioned Months of 1901.

(*Compiled from the Economist.*)

DESCRIPTION.	June, 1901.	July, 1901.	August, 1901.
	£ s. £ s.	£ s. £ s.	£ s. £ s.
South Down - -	7 0 to 8 12	7 0 to 8 10	7 0 to 8 10
Half-breds - - -	6 0 ,, 7 0	6 0 ,, 7 0	6 0 ,, 7 0
Leicester - - -	5 10 ,, 6 0	5 0 ,, 5 15	5 0 ,, 5 15
Kent Fleeces - -	5 10 ,, 6 10	5 10 ,, 6 0	5 10 ,, 6 0

MEAN WHOLESALE PRICES of BUTTER, MARGARINE, and CHEESE in the under-mentioned Months of 1901.

(*Compiled from the Grocer.*)

DESCRIPTION.	June, 1901.	July, 1901.	August 1901.
	Per Cwt.	Per Cwt.	Per Cwt
BUTTER :—	*s. d. s. d.*	*s. d s. d.*	*s. d. s. d.*
Cork, 1sts - -	88 0 —	88 6 —	89 0 —
,, 2nds - -	87 0 —	86 0 —	84 0 —
,, 3rds - -	83 6 —	82 0 —	81 0 —
,, 4ths - -	72 0 —	72 0 —	74 6 —
Irish Creamery* -	92 9 to 95 9	92 0 to 95 11	101 5 to 105 7
Friesland - -	96 0 ,, 100 0	96 0 ,, 99 0	103 0 ,, 105 0
Dutch Factories -	98 0 ,, 101 6	96 6 ,, 99 6	105 0 ,, 108 6
French Baskets -	103 0 ,, 106 6	106 0 ,, 108 0	109 6 ,, 112 0
,, Crocks and Firkins -	91 6 ,, 97 6	94 0 ,, 100 0	97 0 ,, 103 0
,, 2nds and 3rds	85 6 ,, 89 6	86 6 ,, 91 6	87 0 ,, 93 0
Danish and Swedish -	104 0 ,, 106 0	103 6 ,, 106 6	112 0 ,, 114 0
Finnish - -	87 6 ,, 99 6	86 0 ,, 95 6	89 0 ,, 99 0
Russian - -	85 0 ,, 94 0	81 0 ,, 88 0	76 0 ,, 90 0
Canadian and States -	67 0 ,, 99 6	70 0 ,, 101 6	69 6 ,, 105 0
Colonial, fine- -	95 0 ,, 103 0	92 0 ,, 100 0	— —
,, good and inferior -	71 6 ,, 91 0	70 0 ,, 90 0	— —
Fresh Rolls (Foreign) per doz. - -	10 0 ,, 13 0	10 9 ,, 13 6	10 6 ,, 14 0
MARGARINE - -	34 0 ,, 51 0	34 0 ,, 52 0	36 0 ,, 54 0
CHEESE :			
Cheddar, new -	51 0 ,, 71 0	56 0 ,, 60 0	53 0 ,, 67 6
,, Loaf -	68 0 ,, 72 0	62 0 ,, 65 0	64 6 ,, 66 0
Wiltshire, Loaf -	66 0 ,, —	65 0 ,, 66 0	65 0 ,, 66 6
Double Gloucester -	59 0 ,, 62 0	49 0 ,, 55 0	52 6 ,, 56 0
Derby, Factory -	50 0 ,, 59 6	50 0 ,, 55 0	52 0 ,, 53 6

* These prices are the averages of the official quotations of the Price Committee of the Irish Co-operative Agency at Limerick for the choicest Irish pure creamery butter.

WEEKLY PRICES (WHOLESALE) of VEGETABLES and FRUIT at COVENT GARDEN MARKET.

(Compiled from the *Gardeners' Chronicle.*)

Description.	Week ending				
	August 3rd.	August 10th.	August 17th.	August 24th.	August 31st.
VEGETABLES—	*s. d. s. d.*	*s. d. s. d.*	*s. d. s. d.*	*s. d. s. d.*	*s. d. s. d.*
Artichokes, Globe, per doz.	2 0 to 3 0	2 0 to 2 6	2 6 to 3 0	3 0 to 4 0	2 0 to 3 0
Beans, home, Dwf., per sieve	1 6 „ 2 0	3 0 —	3 0 „ 4 0	2 6 „ 3 0	1 6 „ 2 0
Beans, Broad, English, in bushels	4 0 —	3 6 „ 4 0	5 0 „ 6 0	— —	— —
Do. Do. Runners per bushel	4 0 —	4 6 „ 5 6	5 0 „ 6 0	3 0 „ 5 0	3 0 „ 4 0
Beetroots, per bus.	— —	— —	— —	2 6 „ 3 0	2 0 —
Cabbage, per tally	2 0 „ 4 0	2 0 „ 4 0	2 0 „ 4 0	2 0 „ 2 6	2 6 „ 3 0
Carrots, per dozen bunches	1 0 „ 3 0	1 0 „ 3 0	1 0 „ 3 0	1 0 „ 2 0	1 0 „ 2 0
Cauliflowers, pr. doz.	3 0 „ 4 0	3 0 „ 4 0	1 0 „ 2 0	0 9 „ 1 0	1 0 „ 1 6
Cress, per dozen punnets	1 6 —	1 6 —	1 6 —	1 6 —	1 6 —
Cucumbers, per doz.	1 6 „ 3 0	1 0 „ 2 9	1 0 „ 2 0	1 0 „ 1 6	1 0 „ 1 6
Leeks, per doz. bun.	2 6 —	2 0 „ 2 6	1 6 2 0	1 6 „ 2 0	1 3 „ 1 6
Lettuces, Cabbage, per doz.	1 6 „ 2 0	1 6 „ 2 0	1 6 —	1 6 —	1 0 —
Lettuces, Cos, per score	2 0 „ 3 0	1 6 „ 3 0	1 6 „ 3 0	1 6 „ 2 6	1 6 „ 2 0
Mint, per doz. bun.	4 0 „ —	4 0 —	2 6 —	2 0 —	2 0 —
Onions, cases	5 6 „ 6 0	5 0 „ 5 6	5 0 —	5 0 „ 5 6	5 0 „ 5 6
„ in bags	4 9 „ 5 0	4 3 „ 4 6	4 0 „ 4 6	4 0 —	4 0 —
„ new, bun., per doz.	3 0 „ 4 0	3 0 „ 4 0	2 0 „ 3 0	2 0 „ 3 0	2 0 —
Parsley, per doz. bunches	1 6 „ 3 0	1 6 „ 3 0	1 6 „ 3 0	1 6 „ 2 0	1 0 „ 1 6
Peas, Blue, per bus.	4 6 „ 5 0	5 0 „ 6 0	5 0 „ 6 0	3 0 „ 3 6	4 0 „ 5 0
Potatoes, per cwt.	5 6 „ 6 6	4 0 „ 5 0	4 0 „ 4 6	3 6 „ 5 0	3 0 „ 4 6
Radishes, per doz. bunches	1 6 „ 2 0	1 0 „ 1 6	1 0 —	1 0 —	1 0 —
Salad, small, punnets, per doz.	1 3 —	1 3 —	1 3 —	1 3 —	1 3 —
Spinach, English, bushel, halves	1 6 „ 2 0	1 6 „ 2 0	1 6 —	1 6 —	1 0 „ 1 6
Tomatoes, English, per doz. lbs.	3 0 „ 4 0	3 0 „ 3 6	3 0 „ 4 0	2 0 „ 3 6	2 0 „ 3 0
Turnips, new, per dozen bunches	4 0 „ 5 0	4 0 „ 5 0	4 0 —	4 0 „ 6 0	3 0 —
Vegetable Marrows, per dozen	1 0 „ 1 6	1 0 „ 1 6	1 0 „ 1 6	1 0 —	1 0 —
Watercress, per dozen bunches	0 4 „ 0 6	0 4 „ 0 6	0 4 „ 0 6	0 4 „ 0 6	0 4 —
FRUIT—					
Apples, home grown, sieve	2 0 „ 3 0	2 0 „ 2 6	1 0 „ 2 0	1 0 „ 2 0	1 0 „ 1 6
Currants, black, per sieve	6 0 „ 6 6	5 6 „ 6 0	5 6 „ 6 6	5 0 „ 6 0	— —
„ red, per sieve	2 6 „ 4 0	2 6 „ 4 0	2 6 „ 3 0	2 0 „ 3 0	— —
„ white, per gal.	— —	1 6 „ 2 0	1 6 —	1 6 —	— —
Gooseberries, per sieve	1 0 „ 2 0	1 0 „ 2 0	1 9 „ 2 0	— —	— —
Greengages, sieve	— —	5 0 —	3 0 „ 5 6	4 0 „ 8 6	3 0 „ 5 0
Peaches, A per doz.	8 0 „ 12 0	6 0 „ 9 0	7 0 „ 10 0	6 0 „ 9 0	8 0 „ 12 0
„ B, per doz.	2 0 „ 5 0	1 6 „ 4 0	1 6 „ 4 0	1 6 „ 4 0	1 6 „ 4 0
Pears, English Chalks, per bush.	— —	— —	3 6 „ 4 0	3 6 „ 4 0	3 0 „ 4 0
Plums, Czar, sieve	— —	— —	— —	1 0 „ 1 3	1 0 „ 1 3
„ Egg „	— —	— —	— —	1 0 „ 1 3	1 0 „ 1 3
„ Orleans „	— —	— —	2 0 „ 2 6	2 0 „ 2 6	— —
„ Princes „	— —	— —	— —	1 6 „ 4 0	1 6 „ 2 0
„ Victorias „	— —	— —	— —	1 6 „ 4 0	1 6 „ 2 0
„ Violets „	— —	— —	2 3 „ 2 6	2 0 „ 2 6	— —
Raspberries, per dozen punnets	3 0 „ 4 0	3 0 „ 4 0	4 0 „ 5 0	— —	— —

DISEASES OF ANIMALS IN GREAT BRITAIN.

NUMBER of OUTBREAKS of **Foot-and-Mouth Disease** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Board of Agriculture, in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Foot-and-Mouth Disease.		Swine-Fever.	
	OUTBREAKS Confirmed.	ANIMALS Attacked.	OUTBREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	*No.*	*No.*	*No.*
March, 1900	7	99	438	4,980
June, 1900	2	24	736	7,600
September, 1900	7	102	409	2,622
December, 1900	5	41	357	2,731
March, 1901	10	652	625	3,165
June, 1901	2	17	1,490	7,066

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax** and **Glanders** in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including **Farcy**).	
	OUTBREAKS Reported.	ANIMALS Attacked.	OUTBREAKS Reported.	ANIMALS Attacked.
	No.	*No.*	*No.*	*No.*
March, 1900	140	213	259	486
June, 1900	163	279	286	461
September, 1900	109	224	315	474
December, 1900	159	240	259	437
March, 1901	163	223	322	571
June, 1901	197	284	329	552

NUMBER OF CASES of **Rabies** in DOGS in GREAT BRITAIN during each of the under-mentioned periods.

THREE MONTHS ENDED	Number of Cases.
31st March, 1900	—
30th June, 1900	—
30th September, 1900	3
31st December, 1900	3
31st March, 1901	1
30th June, 1901	—

DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Department of Agriculture and Technical Instruction in IRELAND, in each of the undermentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUT-BREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUT-BREAKS Con-firmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	*No.*	*No.*	*No.*	*No.*
March, 1900	—	—	—	40	702
June, 1900	—	—	—	78	1,394
September, 1900	—	—	—	69	1,036
December, 1900	—	—	—	39	577
March, 1901	—	—	—	64	1,265
June, 1901	—	—	—	67	1,242

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax**, **Glanders**, and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including **Farcy**).		Rabies. Cases Reported.	
	OUT-BREAKS REPORTED.	ANIMALS ATTACKED.	OUT-BREAKS REPORTED.	ANIMALS ATTACKED.	DOGS.	OTHER ANIMALS.
	No.	*No.*	*No.*	*No.*	*No.*	*No.*
March, 1900	1	6	4	5	7	—
June, 1900	1	1	3	7	4	1
September, 1900	—	—	1	1	1	—
December, 1900	—	—	2	2	5	1
March, 1901	—	—	1	1	1	—
June, 1901	1	2	3	3	—	1

ORDNANCE SURVEY MAPS OF GREAT BRITAIN AND IRELAND.

The Ordnance Survey are issuing a new series of folding pocket maps for England and Wales on the scale of one inch to the mile. The maps are printed in colours on sheets 18 by 12 inches, mounted on canvas, in a cover or flat, price 1s. each. The one-inch map can also be procured at the same price in black and white, showing outline and contours; or in outline, with hills printed either in black or brown: the outline map has recently been revised. These maps are not only useful for general topographical purposes, but should also prove serviceable to cyclists and pedestrians, since they show all roads, indicating their character and whether metalled or not, footpaths, hills, rivers, towns, villages, railway stations, and local boundaries.

Combined one-inch outline maps have also been published of Bath, Birmingham, Bournemouth, Bradford, Brighton and Worthing, Bristol, Chatham, Clovelly, Derby, Dorchester and Portland, Gloucester and Cheltenham, Huddersfield, Leeds, Leicester, Liverpool, London, Manchester, Nottingham, Plymouth, Rugby, Sheffield and the Peak, Warrington, Warwick and Leamington, Weymouth, Winchester, Aberdeen, Dundee, Glasgow, the Isle of Wight, the Lake District of England, the New Forest, and South-East Kent. Additional maps are in course of preparation.

These combined maps are based on the revised one-inch map. In most cases they are being published folded in covers, and with the principal roads coloured, at prices varying from 1s. to 1s. 6d.

Cheap maps of counties, groups of counties, or districts are also being published on the ¼-inch scale, with main roads coloured, at 6d. plain, or 9d. if folded in a cover.

There are agents for the sale of Ordnance Survey Maps in most of the chief towns, and maps can be ordered and indexes, etc., seen at many Head Post Offices, in places where there are no agents. They can also be ordered, through any bookseller, from the Director-General, Ordnance Survey, Southampton; or, in the case of Ireland, from the Officer in Charge, Ordnance Survey, Dublin.

THE "LABOUR GAZETTE."

The "Labour Gazette," the Journal of the Labour Department of the Board of Trade, contains an article each month on the state of employment among agricultural labourers in the various parts of the United Kingdom. Special articles also appear therein from time to time on the rates of wages paid to agricultural labourers, the Hiring Fairs in Great Britain, and on migratory Irish agricultural labourers. The "Labour Gazette" is issued on the 15th of each month, and may be obtained direct from the Publishers, Messrs. Horace Marshall and Son, Temple House, Temple Avenue, London, E.C., at the rate of 2s. per annum, post free. Copies may also be ordered through any newsagent, price 1d. each.

POST OFFICE SAVINGS BANKS, WITH GOVERNMENT SECURITY.

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LIST OF LEAFLETS ISSUED BY THE BOARD OF AGRICULTURE.

Number.	Title.
Leaflet No. 1	Mites on Currant and Nut Trees.
,, ,, 2	Vine and Raspberry Weevils.
,, ,, 3	The Turnip Fly or Flea.
,, ,, 4	Caterpillars on Fruit Trees.
,, ,, 5	The Mangel Wurzel Fly.
,, ,, 6	The Field Vole.
,, ,, 7	*Out of Print.*
,, ,, 8	Farmers and Assessments to Local Rates.
,, ,, 9	Ensilage.
,, ,, 10	Wireworms.
,, ,, 11	The Daddy Longlegs or Crane Fly.
,, ,, 12	The Gooseberry Saw-Fly.
,, ,, 13	Acorn Poisoning.
,, ,, 14	The Raspberry Moth.
,, ,, 15	The Apple Blossom Weevil.
,, ,, 16	The Apple Sucker.
,, ,, 17	*Out of Print.*
,, ,, 18	Fertilisers and Feeding Stuffs Act.
,, ,, 19	Pea and Bean Weevil.
,, ,, 20	The Magpie Moth.
,, ,, 21	The Warble Fly.
,, ,, 22	The Diamond Back Moth.
,, ,, 23	Potato Disease.
,, ,, 24	The Ribbon Footed Corn-Fly.
,, ,, 25	The Cockchafer.
,, ,, 26	Farmers and the Income Tax.
,, ,, 27	Remission of Tithe Rentcharge.
,, ,, 28	Anthrax.
,, ,, 29	Swine Fever.
,, ,, 30	The Codlin Moth.
,, ,, 31	The Onion Fly.
,, ,, 32	Foul Brood or Bee Pest.
,, ,, 33	Surface Caterpillars.
,, ,, 34	The Woolly Aphis or American Blight.
,, ,, 35	The Celery Fly.
,, ,, 36	Cultivation of Osiers.
,, ,, 37	Rabies.
,, ,, 38	The Carrot Fly.
,, ,, 39	Assessments to Land Tax.
,, ,, 40	The Kestrel or Windhover.
,, ,, 41	The Red Spider or Spinning Mite.
,, ,, 42	The Short-Eared Owl.
,, ,, 43	Titmice.
,, ,, 44	The Common Lapwing, or Plover.
,, ,, 45	The Starling.
,, ,, 46	The Stem Eelworm.
,, ,, 47	The Asparagus Beetle.
,, ,, 48	The Pea Thrips.
,, ,, 49	The Fruit Tree Beetle.
,, ,, 50	Water Wagtails or "Dishwashers."
,, ,, 51	The White or Barn Owl.
,, ,, 52	Gooseberry Blight.
,, ,, 53	The Pear Midge.
,, ,, 54	The Spotted Flycatcher.
,, ,, 55	The Swallow.
,, ,, 56	The Canker Fungus.
,, ,, 57	External Parasites of Poultry.
,, ,, 58	Internal Parasites of Poultry.
,, ,, 59	Improvement of Land Act.
,, ,, 60	The Wood Leopard Moth.
,, ,, 61	Sheep Scab.
,, ,, 62	The Pear and Cherry Sawfly.
,, ,, 63	Destruction of Charlock.
,, ,, 64	White Root Rot.
,, ,, 65	The Small Ermine Moths.
,, ,, 66	Workmen's Compensation Act, 1900.
,, ,, 67	Favus in Poultry.
,, ,, 68	Currant Aphides.
,, ,, 69	Tent Caterpillars.

Copies of the above leaflets may be obtained free of charge and post free on application to the Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W. Letters of application so addressed need not be stamped.

THE JOURNAL
OF THE
BOARD OF AGRICULTURE.

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THE GRAIN HARVEST OF 1901.

The preliminary statement of the estimated produce of wheat, barley, and oats for the current year was issued by the Board of Agriculture on the 3rd inst. Taking Great Britain as a whole, the results of the estimates of the three chief cereal crops supplied to the Board gave for wheat only a satisfactory result, the yield per acre both of barley and of oats being reported to be below that of the year immediately preceding and below the average of the ten years 1891-1900.

The estimated total production of wheat in Great Britain in 1901 was about 52½ million bushels, or within 182,000 bushels of the aggregate estimate for 1900, in which year, however, the area from which this crop was cut was 144,000 acres larger than in 1901. In only two previous years since these official statistics were first collected, viz., in 1893 and 1895, has the total wheat production of Great Britain stood at a smaller figure.

This result is, however, due to the diminished acreage and not to a defective harvest. A comparison of the average yield per acre in the present year with that of previous years makes it appear that in only six out of the seventeen years, 1884 to 1900, has the estimated wheat yield per acre been higher than in 1901. The yield of 30·84 bushels of the past season is 2⅓ bushels above that of 1900 and about one bushel above the ten years' average for Great Britain generally. As over 95 per cent. of the total wheat area is in

England, the influence of that large proportion is necessarily predominant, but, in any case, it happens that on this occasion the results of the harvest on the small wheat acreage of Wales and Scotland respectively tend to neutralise each other. Although the Welsh yield per acre is given as slightly in excess of the decennial average, it is rather more than a bushel under that of last year, whereas in Scotland the yield was 2¾ bushels above last year, and two bushels over the average wheat crop of the past ten years.

The following table shows the estimated total produce an yield per acre of wheat :—

WHEAT.	Estimated Total Produce.		Estimated Yield per Acre.		Average of the Ten Years 1891-00.
	1901.	1900.	1901.	1900.	
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
England - -	49,882,667	49,528,385	30·84	28·39	29·91
Wales - - -	1,156,673	1,332,299	24·67	25·79	24·24
Scotland - - -	1,418,262	1,779,125	39·15	36·43	37·08
Great Britain - -	52,457,602	52,639,809	30·84	28·53	29·93

It appears that not only absolutely but in comparison with the previous year, the most satisfactory crops of the last harvest were obtained in the great corn-growing division of England, which comprises the counties of Bedford, Huntingdon, Cambridge, Suffolk, Essex, Hertford, Middlesex, Norfolk, Lincoln, and the East Riding, the average wheat yield, as estimated for the purpose of these returns, being 3⅓ bushels above that returned for that district in the preceding year. On the other hand, it would appear that the yield on the comparatively limited wheat acreage of the northern division, comprising the counties of Northumberland, Durham, the North and West Ridings of Yorkshire, Cumberland, Westmorland, Lancaster, Stafford, Chester, and Derby, was only fractionally above that returned for the preceding year.

In only one previous year, 1893, has the estimated yield per acre of barley been lower than that returned for the current year. This crop was, indeed, nearly three bushels per acre below the average of the preceding year in England, and although the deficiency in Wales was much less, and an excess above the average of about half a bushel per acre was recorded in Scotland, the net result for Great Britain stands at only 31 bushels per acre, or $1\frac{1}{3}$ bushels below 1900, and rather more than 2 bushels less than the decennial average. The deficiency, as compared with the preceding year, was most marked in the South-eastern and East-midland division comprising the counties of Kent, Surrey, Sussex, Berks, Hants, Nottingham, Leicester, Rutland, Northampton, Bucks, Oxon, and Warwick, and in the sub-division comprising the counties of Cumberland, Westmorland, Lancaster, Stafford, Chester, and Derby. In the four south-western counties, on the other hand, the crop seems slightly to have exceeded that of 1900.

The comparative results for barley are given below:—

BARLEY.	Estimated Total Produce.		Estimated Yield per Acre.		Average of the Ten Years 1891-00.
	1901.	1900.	1901.	1900.	
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
England - - - -	49,557,593	50,977,265	30·30	30·99	33·03
Wales - - - -	3,016,334	3,341,872	29·60	31·81	30·26
Scotland - - - -	8,533,696	7,995,373	36·30	33·29	35·79
Great Britain -	61,107,623	62,314,510	30·98	31·31	33·13

The average yield per acre of oats for Great Britain was $36\frac{3}{4}$ bushels, or about $1\frac{1}{4}$ bushels below 1900, and $1\frac{3}{4}$ bushels below the ten years' average. In England alone the deficiency was, in fact, much greater, being about double in each case. But the production of this crop in Scotland, where nearly one-third of the area under oats is to be found, was much better than that realised south of the Border, the Scottish yield being estimated to have even exceeded by

more than a bushel per acre the average results of the ten years 1891-1900. The comparative figures of the estimates of the oat crop are as follows:—

OATS.	Estimated Total Produce.		Estimated Yield per Acre.		Average of the Ten Years 1891-00.
	1901.	1900.	1901.	1900.	
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
England - - - -	67,863,053	73,604,178	37·05	39·56	40·38
Wales - - - -	6,490,336	7,238,305	31·09	33·44	33·18
Scotland - - - -	35,752,141	34,005,054	37·38	35·83	36·19
Great Britain -	110,105,530	114,847,537	36·74	37·95	38·47

The subjoined statement shows the yield per acre of Wheat, Barley, and Oats in the years 1901 and 1900, in each of the divisions into which England is commonly divided for the purposes of the Agricultural Returns:—

DIVISIONS OF ENGLAND.	Estimated Yield per Acre.					
	Wheat.		Barley.		Oats.	
	1901.	1900.	1901.	1900.	1901.	1900.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
I. (*a*) Beds., Hunts., Cambs., Suffolk, Essex, Herts., Middlesex, London - -	31·93	27·46	30·66	30·80	39·94	42·41
(*b*) Norfolk, Lincoln, York, E. Riding -	31·95	29·97	30·49	30·92	42·88	43·24
II. (*a*) Kent, Surrey, Sussex, Berks., Hants.	31·17	28·77	29·40	31·60	38·40	40·15
(*b*) Notts., Leicester, Rutland, Northants, Bucks., Oxon., Warwick - - -	28·99	28·23	27.28	29·16	30·91	34·35
III. (*a*) Salop, Worcester, Gloucester, Wilts., Monmouth, Hereford	30·27	28·13	29·34	30·16	35·37	36·86
(*b*) Somerset, Dorset, Devon, Cornwall -	28·57	25·76	31·10	30·92	35·53	38·50
IV. (*a*) Northumberland, Durham, York N.R., and York W.R. -	28·84	28·43	32·76	33·39	36·58	39·81
(*b*) Cumberland, Westmorland, Lancs., Stafford, Cheshire, Derby - - -	30·72	30·85	30·57	32·09	34·44	38·83

ENGLISH COPPICES AND COPSEWOODS.

The more one studies the ancient laws and conditions affecting the forests and woodlands and the production of wood and timber throughout England during the thirteenth to the seventeenth centuries, the more does the fact seem to stand out with unmistakable clearness that the great national system of arboriculture—namely, the method of coppice or copse, either purely in the form of simple coppice or else consisting of standard timber trees growing over an underwood which was regularly coppiced by being cut only at comparatively short intervals—reached its highest technical development during the first half of the seventeenth century. Since then it has undoubtedly declined. This decline, as regards attention to the careful management of the woodlands, can easily be accounted for by the action of various specific causes at different times. The discovery of coal and of its uses revolutionised English domestic affairs, and was one of the essential factors in evolving the vast commercial prosperity which would not have been possible if England had continued dependent upon her woodlands for supplies of fuel and firewood. During the last hundred years one of the most important of these causes has been the remarkable improvement in transport by land and sea; while in more recent years the three chief factors militating against the more intensive treatment of coppices and copsewoods have been the reduction in the market rate obtainable for small wood owing to the use of substitutes of one kind or another, the dearth and the increasing cost of labour in nearly all the rural tracts, and lastly, though not least, the ravages of ground game both as regards underwoods and young timber trees.

Apart from the beams and scantlings needed for building boats and ships, and making bridges, and for internal work

in the construction of churches, religious houses, and the castles of the great nobles and landowners—for all of which purposes the wood of the oak was much preferred to that of any other tree—most of the requirements of the common-folk, both in towns and in rural tracts, could quite well be supplied by the coppices or underwoods. At the time of the Norman Conquest houses were usually constructed only of wattle or interlaced branches plastered over with mud to keep out the wind, and no inconsiderable portion of the buildings in cities and towns was thus roughly formed of inferior materials. This rude state of affairs apparently continued for about five hundred years, for the Rev. Wm. Harrison in his *Description of England*, incorporated in the Holinshed *Chronicles* (1586), speaks of the people in the country districts as no longer being content to live in houses made of sallow poles and such-like, but encroaching on the timber supplies of the country by using oak and other woods of the better class.

In most counties of England few tracts that were still at all heavily wooded escaped being afforested to a greater or less extent. Despite the savage severity of the forest laws during the Norman and the Plantagenet periods, and the prohibitions and heavy penalties then existing with regard to the clearance for agriculture and pasturage of woodlands situated within the bounds of any royal forest, the total area under woods and coppices most probably shrank very considerably throughout the country; and as this diminished, while the population and the herds of cattle and other animals increased, it became necessary to protect the coppices and copses from being damaged during their early years by the cattle, horses and sheep which were allowed to roam about the holdings and the commons. And no doubt the large herds of almost sacred royal deer did even more damage than these to the young stool-shoots, suckers and saplings which sprang up when coppices were periodically cleared within the forests and the purlieus (or disafforested tracts) adjacent thereto.

To afford the necessary protection to the young coppices and copses against deer, cattle and other farm stock, only one course was open, and that was enclosure by means of stout fences. Without this, regeneration and reproduction could

usually at least be only partial, because young shoots of all kinds, and more especially the "young spring" consisting of stool-shoots and suckers full of sap, are dainty morsels for all such animals. The necessity for protection of this sort appears to have been tacitly recognised even within the boundaries of the royal forests during the fifteenth century. Indeed, that enclosure for natural regeneration and reproduction of stool-shoots and stoles had then long been practised as a common custom in woods unfortunately forming parts of the afforestations seems very clear from the preamble to the first Arboricultural Act passed in England—that of Edward IV. in the year 1482. This preamble declareth how, "Item, our said Lord the King, considering that divers subjects having woods growing in their own ground within the forest of Rockingham, and other forests and chases within his realm of England, or purlieus of the same, which have cut their said wood, because the same subjects might not before time cut nor inclose their said ground, to save the young spring of their wood so cut, any longer time than for three years ; (2) the same young spring hath been in times past, and daily is destroyed with beasts and cattle of the same forest, chases and purlieus, to the great hindrance, as well of his said subjects, as of his deer, vert and venison in their covert, and otherwise likely to be the destruction of the same forests, chases and purlieus, etc." Hence enclosure of coppices and copsewoods for purposes of regeneration and reproduction was by this Act of 1482 legally extended from the customary period of three years to one of seven years after each time of cutting the coppice or underwood.

It will be noted that this first Arboricultural Act had reference mostly to woods situated within the royal forests ; and it was not in any way compulsory. It granted a boon, the liberty to enclose the "young spring" of the woods for a considerably longer period than had previously been customary. We have no record as to the customary period of enclosure against cattle and other stock in woods to which the prohibitions of the forest laws did not apply ; but it was probably also not less than seven years, even though such coppices were not browsed on by herds of royal deer.

During the sixteenth century, however, the simultaneous shrinkage in the area of the woodlands and the growing demands for timber and smaller wood caused such grave national apprehension as to call for legal measures prohibiting the destruction of the woods and the diminution of the supplies of timber. This consequently led to the passing of the *Act for the Preservation of Woods*, better known as the *Statute of Woods*, in 1543, during the reign of Henry VIII. Here again the key-note to the tenor of the whole Act was struck in the preamble, which shows how "The King our Sovereign Lord perceiving and right well knowing the great decay of timber and woods universally within this his Realm of England to be such that unless speedy remedy in that behalf be provided, there is great and manifest likelihood of scarcity and lack as well of timber for building, making, repairing, and maintaining of houses and ships, and also for fuel and firewood for the necessary relief of the whole community of this his said realm. . ."

The main provisions of this *Statute of Woods*, the greatest Arboricultural Act which has ever been passed in Britain, were that after Michaelmas, 1544, "in and upon all and singular several woods, commonly called coppice woods or underwoods, which . . . . shall be felled at twenty-four years' growing or under there shall be left standing unfelled, for every acre of wood that shall be felled within the said coppice, twelve standils or storers of oak." Failing oak, then the twelve storers per acre were to be made up of elm, ash, asp, or beech, likely to prove and to be timber trees. These storers were in reality intended to be double stores or stems reserved to attain the age at least three falls of the coppice, because it was expressly laid down that

"(4) the same standils or storers to be of such standils or storers as have been left there standing at any the felling of the same coppice woods or underwoods in times past; and in case there be no such standils or storers there standing, which were there left at the last felling of the same coppice or underwoods, then the same standils or storers there to be left shall be left at this now next felling of the said coppice woods or underwoods, of such most likeliest oaks, and if there be not sufficient of oaks, then of the most likeliest elms, ash, asp, or beech, to prove and to be timber trees, as shall grow within any such several woods, coppice, or underwoods; (5) and that the same standils or storers so left shall be preserved and not felled or cut down till the and every of them shall be of ten inches square within three foot of the ground."

The penalty for felling coppice without leaving standard trees as thus ordered was a fine of 3s. 4d. for each storer not so left standing, and a further fine of 3s. 4d. was levied for any standard felled in contravention of the Act before attaining a proper girth. And to encourage informers half the amount of the fines was made payable to them, while the other half went to the King. Provision was also made for the enclosure and fencing for four years of all coppices worked with a rotation of fourteen years or less, under a fine of 3s. 4d. per acre for every month during the four years "that the same coppices or underwoods shall happen to lie or be unenclosed, not fenced, saved or preserved." No calves were to be grazed within the woods for two years after felling, and no other cattle within four years. And, similarly, coppices worked with a rotation of between fourteen and twenty-four years were to be enclosed and fenced for six years, subject to the like penalty. When woods or coppices having standards of over twenty-four years in age were felled or thinned ("weeding" was the term used), then "for every acre so felled, twelve trees of oak of the same such great trees" (or, failing these of elm, ash, asp, or beech), were to be left standing for the next twenty years, and the falls were to be enclosed and fenced for seven years, under penalty of 6s. 8d. per tree felled in excess of this statutory injunction, and of 3s. 4d. per acre per mensem in the event of failure to enclose. After Michaelmas, 1544, no coppice woods of two acres or more in extent were to be converted into tillage or pasture land, if distant two furlongs from the house of the owner or tenant thereof, under penalty of 40s. per acre thus transformed.

This *Statute of Woods* was something entirely different from the Act of 1482. This new enactment was compulsory, prohibitive, and applied to all woods throughout the realm; whereas the Act of two generations before had been purely permissive in character, and had applied only to woods situated within the royal forests and chases, and their purlieus. Stringent measures had become the order of the day, consequent on the dearth of timber and wood of all sorts, for fuel as well as for constructive purposes.

But even the great and firm step thus taken in 1543 was

soon found to be so insufficent that during Queen Elizabeth's reign, in 1570, the period of enclosure ordered for the different classes of woods had each to be increased by two years, "for that by experience it is found that the space and time of the said several years of inclosure or preservation is not sufficient."

Indeed, the national outlook for timber was at that time not only gloomy, but also a matter of extreme importance. Already prominently mercantile, the national prosperity depended to a great extent on the proper maintenance of the naval and mercantile fleets; and while these latter continually tended to increase numerically, the capacity of the English woodlands to supply the necessary quantity of timber, especially of oak timber, was apparently rapidly diminishing. Surveys of the existing stock of timber in the royal forests were made in 1565, by Roger Taverner, and about twenty years later by John Taverner, probably Roger's son or nephew; and another survey was also made in 1608 by order of King James I. From a careful study of the subject it seems to me that, without doubt, the reign of King James I. marked the highest level as regards endeavours to attain a high standard of arboriculture in English coppices and copse-woods, whether belonging to the Crown or to the great landowners in general.

That James I. was evidently very anxious to preserve the timber in the royal woodlands is clearly shown in the instructions of a Commission concerning *Woods* (State Papers, Domestic; 1607), which orders that these things are to be considered in the execution of the Commission by the Commissioners and the jury, that is to say—

"A survey of the number of coppice woods; how many acres each coppice containeth; of how many years' growth the same is; what every coppice is worth by the acre; in whose possession the same is; if granted to any person, then for what term and upon what consideration; whether the trees and the standels be preserved in every coppice according to the Statute; and what waste and spoil hath been made in the same coppices or any of them, and by whom. . . . . To consider how many acres of coppice woods will be necessarily reserved for the fencing and enclosing of new woods to be raised that the number of the trees sold may be trebled by that planting, and whether the aldermores*, lops of thorns, and such like underwoods, will be sufficient for continuing the enclosure."

* *Aldermores*—i.e., alder moors, on the boggy parts.

The results of this survey made during 1607 and 1608 were evidently far from encouraging, because the Sovereign became imbued with a strong desire to put matters on a better footing both in the Crown forests and in other private woodlands. Hence came the celebrated Proclamation for the Preservation of Woods (Patent Roll, 5th July, 1608; 6, James I.), to the following effect:—

"Forasmuch as by a late view and survey had and made of the most part of our woods in divers counties of this realm it is certified unto us that great spoils and devastations are committed both within our Forests, Chases, Parks and wastes not only by bordering inhabitants but even by Woodwards, Keepers, and other of our own inferior Officers such as ought to have had the Chief care of the preservation thereof, ... We therefore as respective of the good of our posterities as our own have endeavoured to take course to stop the said abuses and all others too long practised and to work the means not only of better preservation of our said woods in times to come but also of a present multiplication and increase of timber and wood to all future ages and to the end that our care may appear to extend to the preservation and increase of timber as well in general to others as to ourselves. We have thought meet by this our proclamation not only to divulge our special pleasure touching our own woods, but also straightly to command and charge all our loving subjects in general that in their own woods they presume not hereafter to defraud the true meaning of our Statutes in these cases provided by cutting and felling the young storers when they usually fell their underwoods which the Statute intended and appointed to be altogether preserved for timber, wherein if they shall be found to offend they are to expect no favor as doing an apparent wrong to the Commonwealth beside the breach of law and our royal commandment. And We do also straightly command our loving subjects that for avoiding of future spoils they nor any of them presume from henceforth to commit any act under whatsoever colour or pretence not warranted in the true intent of our Laws or the grants made unto them whereby our said woods may be diminished, defaced or abused. And further that neither our Keepers of Walks or Rangers or any other Officer or Officers whatsoever in Forests, Chases, or Parks do under colour of browse for our deer, firewood, or fuel for themselves or other pretence whatsoever presume to cut or take more than shall necessarily suffice without wasteful expense or colourable sale, etc. . . . . And that no inhabitant in or near our Forests, Chases, or Wastes. . . . . cut or take any young saplings of oak, elm, ash, beech or any other tree likely to prove timber growing in any of our said Forests Chases or Wastes nor to enter into any of our Coppices of underwood to cut spoil or waste the same under any pretence or colour except it be for necessary cases and the same lawfully warranted. . . . . etc.—[5th July, 6 James I.] (By the King himself.)

King James, however, did more than merely issue a proclamation. He caused what was practically a rough and simple *Working Plan* or *Scheme of Management* to be drawn up for the treatment of the Crown woods scattered over various counties; and this seems the first instance of any systematic attempt having ever been made in England to work the Crown coppices and copsewoods as a whole (*Working Circle*) according to some definite and well-considered method.

The brief details regarding this simple Working Plan are to be found in a Minute entitled "Treasury Office; Increase of Revenue" (Cottonian MSS., Titus B IV.; tempore James I.), which is well worth giving in extenso :—

Planting, Increasing, and Preserving of Woods.

To enclose the fourth part of wastes, according to the Statute, and there to plant and preserve coppice woods, and at the time of cutting every Coppice to leave forty standels in every acre, which will increase the timber trees.

The Forests and Chases are the meetest places to raise and preserve timber trees and underwoods, and therefore it will be both necessary and profitable to raise in them 51,000 acres of coppice woods in fifteen years, enclosing (for the avoiding of great charge of enclosure) 200 acres in every Coppice.

The King hath already 30,000 acres of coppice woods and coverts of holms, thorns, and such like underwoods.

The new planted Coppice woods, 51,000 acres.
In all ... ... 81,000 acres.

Every year to fell 5,400 acres at £4 an acre is £21,600 per annum, besides the Coppices that are raised belonging to manors.

The Charge for Raising of New Woods.

The 51,000 acres of new woods to be raised must be proportionally divided into fifteen equal numbers, which will be 3,400 acres yearly to be planted, making thereof seventeen coppices, containing 200 acres.

The enclosure of the Coppices, being laid square, will be 716 poles, which will cost in the dyking, planting, cutting, and carrying of stuff to make the hedge, eighteen pence a pole, which amounteth to £53 14s. for the enclosing of every Coppice, which, with careful husbandry, being planted with young furzes will be a perpetual fence, without further charge where such plants may be gotten.

The ploughing of 200 acres at 3s. 4d. an acre is £36 13s. 4d.

The gathering of four bushels of acorns, for planting of every acre, at fourpence the bushel is £3 6s. 8d.

The planting of the acorns by men's hands 3s. an acre, which is £30 every Coppice.

The whole charge of planting and enclosing a Coppice of 200 acres will be £123 14s.

Besides 40s. by the year to be allowed for a man to look unto and repair the hedges until the furzes be grown up, which in four years will be so high and so strong a defence that neither deer nor any other cattle will be able to go through or over it.

So that the whole charge of planting and defencing of seventeen Coppices yearly, every Coppice containing 200 acres, amounteth to £2,102 18s., which in fifteen years will amount to in all £31,543 10s.

So that the charge for raising of 51,000 acres of Coppice cometh to £31,543 10s., besides the allowance of 40s. by the year for a man to look unto the hedges.

The benefit that will come unto the King is £220,000, to be raised in two years, and after fifteen years £21,600 yearly.

The charge of the raising of the new woods will be defrayed with £20,000, parcel of £220,000, and the benefit of Coppices in Forests and Chases already grown if they may be sold to the best advantage.

These instructions, together with the Statutory orders of 1543 and 1570 as regards the selection and storing of standards, really constitute a definite though rough and simple scheme of management, under which all the royal woods throughout England were treated as forming so many

different portions of one working circle. The principal object was the growth of oak timber for the navy; and the free, isolated position of standard trees in the copsewoods (as also in hedgerows) was the very best manner imaginable for producing the strong knees and natural crooks required for the purposes of shipbuilding, and for stimulating the rate of growth into useful, marketable size.

Long previous to this date mere enclosure, or *encoppicement*, as it was termed, was not solely relied on for obtaining a good and thick growth of underwood. Natural regeneration and reproduction were often assisted by sowing or planting, as a catalogue of the woods in the New Forest in 1565 mentions some of them as having been "set" with oak and beech. In raising King James' new coppice woods, "the planting of the acorns by men's hands" was, of course, sowing or dibbling; but planting of young trees was probably far from unusual, as Fitzherbert deals with the removal and planting of trees in his *Book of Husbandry* (1523). But dibbling at 3s. an acre had the great advantages of cheapness and simplicity. An impetus to planting was, no doubt, given by the publication, in 1613, of Arthur Standish's *New Directions of Experience. . . . for the planting of Timber and Fire-wood, etc.*, a small book of 34 pages. A second edition of it was published, "authorised by the King's most Excellent Majesty," in 1615, and King James even prefixed this with a royal proclamation exhorting his subjects to give heed to the recommendations therein made for the increase of timber and firewood.

As to how far James I.'s scheme of management for the royal woodlands was carried out, and when it was abandoned, nothing definite can be said. Apparently the matter was gradually lost sight of officially in later times, and the only special adoption of a subsequent regular Working Plan for any of the royal coppices or copsewoods is that drawn up for the High Meadow Woods in the Forest of Dean (Gloucestershire), in 1897, to which reference will afterwards be made.

After the Restoration the subject of Arboriculture in general seems to have received greater attention than had been given to it since the time of James I., though we may perhaps be misled in this matter by the brilliant reputation immediately

achieved by Evelyn's classic work, *Silva*; *or*, *a Discourse of Forest Trees*. From Chapter I., "*of Coppices*," in the third book (*Dendrologia*) of *Silva*, we can see that the prevailing nature of the copsewoods then was not very different from what still usually obtains nowadays, though there was apparently far more method in storing standards than has now been customary for a long time back. "Our ordinary coppices," he says, "are chiefly upon hazel or the birch; but if amongst the other kinds, store of ash (which I most prefer for a speedy and erect growth), chesnut, sallow, and sycamore (at least one in four) were sprinkled in the planting, the profit would soon discover a difference, and well recompense the industry." The rotation at that time varied from eight or nine to twenty years, and, exceptionally, went on as long as twenty-five to thirty years; "but those of twenty years standing are better, and far advance the price, especially if oak, and ash, and chestnut be the chief furniture; and be sure you shall lose nothing by this patience, since, all accidents considered, the profit arising from copses so managed (be the ground almost never so poor) shall equal, if not exceed, what is usually made by the plow or grazing."

Apparently the *Statute of Woods* of 1543 and the amending Act of 1570, together with the exhortations and example of James I., had done something at any rate, if not as much as had been desired, to improve the condition of the copses. "As to what numbers and scantlings," continues Evelyn, "you are to leave on every acre, the statutes are our general guide, at least the legal. It is a very ordinary copse which will not afford three or four firsts, that is, bests, fourteen seconds, twelve thirds, eight wavers, etc., according to which proportions the sizes of young trees in copsing are to succeed one another. By the Statute of 35 Henry VIII. in copses, or underwoods, felled at twenty-four years' growth, there were to be left twelve standils or storers of oak upon each acre; in defect of so many oaks, the same number of elms, ash, asp, or beech; and they to be such as are of likely trees for timber, and of such as have been spared at some former felling, unless there were none; in which case they are to be *then* left, and so to continue

without felling, till they are ten inches square within a yard of the ground. Copses above this growth felled, to leave twelve great oaks; or in defect of them other timber trees as above, and so to be left for twenty years longer, and to be inclosed seven years. In sum, you are to spare as many likely trees for timber as with discretion you can."

The underwood was "cut from January, at latest, till mid-March or April, or from mid-September till near the end of November." As may also be very strongly recommended at the present time (wherever labour and funds are available, and the crop is likely to become more profitable by such treatment), he advocated that the coppices should "for the first two years be kept diligently weeded and cleaned, which is as necessary as fencing and guarding from cattle." This is quite true, only nowadays the monetary returns yielded by coppice-hags are often so small as to make such weeding and cleaning an operation that would not be profitable.

Indeed, Evelyn's directions and remarks are so sound and practical as to be just as suitable for application now as they were 250 years ago. There is so much which is not merely of interest, but which may very well be applied for the improvement of copsewoods to-day, that it is well to take note of many of his precepts; because they are every bit of as much value now as ever they were. After all, the most modern scientific methods for the treatment of coppice with standards (already long customary in France and Germany, but only now beginning to make way in England) are apparently only systematised modifications of the practices obtaining and of the recommendations made for the improvement of coppices on English estates during the seventeenth century. Regarding copsewoods we do not so much need to borrow ideas from foreign countries as to revive this national branch of arboricultural art, which seems once to have been far better understood than during the last fifty years. My reason for saying so much about the old methods is that many improvements will be effected if landowners are again able to resort to them. Thus, Evelyn strongly advocated a continuous succession of annual falls, which seems to imply that even then fellings were sometimes as casual, haphazard, and irregular as is now often the

case. "If copses were so divided as that every year there might be some felled, it were a continual and a present profit." Just so; equality of out-turn is one of the specific objects aimed at in an up-to-date Working Plan or Scheme of Management. Again, to induce a good thick flush of stool-shoots and root-suckers, he counsels the fall of the timber trees and the underwood being made "as near the ground as may be. . . . The cutting slanting, smooth and close is of great importance. . . . Cut not above half a foot from the ground, nay the closer the better." So, too, in advising that "in thin copses it is profitable to lay some boughs athwart, which will be rooted to advantage against next fall," he clearly indicated one of the best possible ways of filling up blank patches, by means of layering or plashing He also very correctly remarks regarding stoles or suckers that "trees which are apt to grow from the running-root thicken the wood exceedingly," although the kinds of trees he advises to be planted for this purpose (elm, cherry, poplar, sallow, and service) are not those which can usually be grown with profit in mixed coppices nowadays.

Simple coppice, without standards, was apparently not then common, though the standards in copse were sometimes pollarded. "In the meantime, there are some who find it not so profitable to permit so many timber-trees to stand in the heart of copses, but on the skirts and near the edges, where their branches may freely spread and have air, without dripping and annoying the subnascent crop; nor should they be shread (*i.e.*, lopped or pollarded), which commonly makes them grow knotty."

The selection of stores, a matter of the first importance, was to be carefully made. "When you espy a cluster of plants growing as it were all in a bunch, it shall suffice you that you preserve the fairest sapling, cutting all the rest away" —a rule which, of course, still obtains, though saplings sprung from seed, or else suckers, deserve the preference over stool-shoots.

With regard to the standards (except in the case of oak) he recommended a little judicious pruning, as the modern forester would to-day whenever funds are available and the

operation promises to be profitable. "Then, as you pass along, prune and trim up all the young wavers (*i.e.* double stores), covering such roots as lie bare and exposed with fresh mould. There are some who direct the lopping of young oaks at a competent distance from the stem, and that while the wounds are healing this would advantage the underwood; but I cannot say it would be without prejudice to timber." In these present times of difficulty in finding a profitable market for small poles and other smaller coppice material, it is, however, curious to read of Evelyn's wish that the hop industry should not continue to be such a drain on the English woodlands. "It were to be wished that some approved experiments were sedulously tried, with the advice of skilful and ingenious physicians, for the making of beer without hops; . . . . . it might prove a means to save a world of fuel, and in divers places young timber and copse wood, which is yearly spent for poles, especially in countries where wood is very precious."

J. NISBET.

(*To be continued.*)

CURRANT APHIDES

(*Rhopalosiphum ribis*, Linn., and *Myzus ribis*, Linn., etc.)

I. Currant Leaf Blistered by Aphides.

During the past season considerable damage has been done to currants by Aphides or Plant Lice. In some districts the bushes were quite ruined, the leaves turned brown and shrivelled up, and the fruit fell off, the

bunches "shanking" in consequence of the abnormal presence of these pests. The rapid increase of the "Plant Lice" was due to the long spell of dry, warm weather so favourable to the development of these insects, so detrimental to the development of the fruit and health of the bushes. Aphides are usually more or less prevalent on the currants, and are always liable under certain climatic conditions, such as existed during the past June, to increase to an injurious extent.

Currant bushes should therefore be washed early in the year just as regularly as apple, plum, and pear trees. Four species of Aphides, or Dolphins, occur on the three kinds of currants, two are more or less confined to the currant and other *Ribes*, namely, the Currant Blister Aphis (*Rhopalosiphum ribis* of Linnæus) and *Myzus ribis* of Linnæus, the third species found is the Cherry Aphis (*Myzus cerasi*, Fabricius), and a fourth species is at present unidentified.

The two true *Ribes* species work in a slightly different way. One, *R. ribis*, produces reddish, reddish-brown, or yellow blister-like galls on the surface of the leaves, whilst *Myzus ribis* often causes the leaves to curl up, especially on the top shoots. Both species are equally difficult to destroy after they commence to breed in numbers, owing to their being hidden, and more or less protected in the hollows of the blisters and under the curled-up leaves. The galled patches are chiefly noticed on the upper surface of the leaf, where they are blister-like ; below they are concave. In this cavity the Aphides live and breed, increasing the area of the disease patch as they develop. Numerous blisters may be formed on one leaf, varying in size from one-fourth to nearly an inch in length. Occasionally a moss-like growth may be seen inside and outside these galls. The leaves so attacked shrivel away, but the fruit often falls owing to loss of sap long before the leaves die. Neither of these Aphides form much "honey-dew" early in the year, hence the diseased appearance of the leaf is often not noticed as being of insect origin during the early stages of the attack unless an examination has been made of the under surface. The fruit has been particularly noticed to "run

off" before the leaves die away, on poor soil or where the drainage is bad, or on so-called "pinnocky" spots on the green-sand soil of Kent. Later "honey-dew" becomes abundant, being especially formed by the leaf-curling

II. CURRANT SHOOT DEFORMED AND STUNTED BY APHIDES.

species; on black currants the "honey-dew" often gives a shiny and sticky appearance to the whole bush.

Myzus ribis is especially found on the black currant, but also on the red and white, and sometimes on the gooseberry. *Rhopalosiphum ribis* is more often found on the red currant than the former species, but is also abundant on the black and the white.

The insects spread chiefly by means of winged generations, which appear every now and then, flying from bush to bush, and there setting up fresh areas of disease. These winged generations may occur as early as the middle of May, but usually not until June.

These two insects seem to have been treated as one; Miss Ormerod merely calls them *Aphis ribis*, but the two are perfectly distinct. *Myzus ribis* occurs abundantly on the Continent: Kaltenbach speaks of it as destructive in Germany, and Taschenberg also refers to it as forming lumps and curling up the leaves.

It appears to have been imported into America, for Saunders mentions it as an imported insect. Lintner also says it is destructive in the States.

Life-history.

The appearance and habits of the two commonest currant Aphides are different, but their life-history is very similar.

(I.) *Rhopalosiphum ribis*, Linn.—The wingless viviparous female, or "Mother Queen," is shiny green, mottled with darker green; legs, cornicles, and antennæ pale green; eyes, red. In form it is oval and convex, and larger than the species named below (II.); the body being one-tenth of an inch long. The wingless females are found under the leaves and cause the red, reddish-brown, orange, and yellow blisters. They appear first of all in April, and occur continuously until July and even August. Every now and then the lice to which they give rise turn into pupæ; rudiments of wings appearing as wing-buds.

The pupa is green, and does not differ much from the wingless female or larva. The winged viviparous female, which arises from the pupa, is yellowish-green with black head, antennæ, joints to the legs, black thorax with a yellow band in front; the abdomen is bright yellowish green, with dark spots and patches on the dorsum and sides; yellow honey-tubes, swollen towards the apex; ochreous legs with dark joints. These winged females fly from bush to bush. In the autumn or late summer males and ovigerous females

are formed; the egg-laying female, after being fertilised, depositing her few brown elongated eggs on the last year's growth of a twig just under the broken rind or upon it. Here the eggs remain all the winter. During the present winter they may be seen in great numbers on the currant bushes. A number of the winged females seem to leave the bushes at the end of July, but some always remain. This aphis, besides feeding on the red, black, and white currant, also attacks the gooseberry, and it has been found in the Guelder rose (*Viburnum opulus*), the nipple wort (*Lapsana vulgaris*), and the sow thistle (*Sonchus*).

(II.) *Myzus ribis*, Linn.—This plant-louse can easily be told from the former by its olive, not black, head, and its black cornicles and irregularly black ornamented abdomen in the winged female. It occurs from April to August, especially in the black currant and gooseberry, but also on the red currant; it is said to cause blisters similar to those shown in Figure I. It often causes the leaves at the apex of the shoots to curl and twist up, and has been noticed to deform the shoots more often than the former species. Lintner also refers to it as contorting the leaves. It is apparently the *Rhopalosiphum ribis* of Koch.

The apterous or wingless female, which appears in the spring, is shiny yellowish green, with dark green mottlings, elongated oval in form, and with curious capitate hairs in front; the cornicles and legs are pale green, and the eyes reddish. The lice or larvæ are pale green. When the leaves lose their sap the larvæ turn to pupæ, and then to winged females. The pupa of this species is shiny yellowish-green, with two horny spots on the occiput. The winged viviparous female is bright green, with pale olive head, brown thorax with an olive band across the prothorax, irregular transverse bands and spots on the abdomen, and four or five dark lateral spots; the deep olive green to black cornicles are cylindrical in form, and the deep green legs have olive tarsi. The eyes are again red in colour in the larvæ. Towards July many leave the currants, but as in the former species some always remain, and give rise to viviparous females and males, the former depositing their long brown eggs under the exfoliated

rind, attaching them to it by a gummy excretion; here they remain until the spring, when they give rise to larvæ, which soon grow into the "Mother Queens." The wingless female is smaller than the former species, being little more than one-twelfth of an inch long.

Natural Enemies.—The larvæ and the adults of the two-spotted Lady Bird (*Adalia bipunctata*) are often to be found feeding amongst the colonies of lice, and do inestimable good in keeping them in check. Larvæ of several species of Hover Flies (*Syrphidæ*) also feed upon them, these leech-like repulsive green or dull red larvæ living among the lice in the blisters or curled leaves, and one may devour as many as twenty lice in a day. *Ichneumons* do not appear to be parasitic on either of these species, nor do the Lace-Wing or Golden-eye Flies (*Chrysopa*) seem to feed on them.

Prevention and Treatment.

Little can be done to prevent the attack of these currant lice. Black currants should be cut very hard in the autumn after an attack, and the strippings carried away and burnt. By so doing many eggs will be destroyed. Probably some benefit would be derived by the winter washing with caustic alkali wash. The use of this spray is not only to rid the plant of vegetal incumbrances—moss and lichens which shelter various hibernating insects—but it also affects the eggs of certain insects, such as the *Psyllidæ* and some *Aphididæ*. It will also remove the Brown-scale, *Lecanium ribis*, often noticed on currant and gooseberry bushes.

Caustic alkali wash is prepared in the following way:—Dissolve 1 lb. of caustic soda and 1 lb. of carbonate of potash separately in water, then mix the two together and add to 10 gallons of soft water; then add to this $\frac{1}{2}$ to $\frac{3}{4}$ lb. of dissolved soft soap (Chiswick), or 1 lb. of coarse treacle. Spray over the bushes about February.

When Aphides are present on the bushes it is most important to *spray early in the year*, directly the lice are seen that is before the blisters appear or the leaves become curled up; the lice can then be readily reached by the spray, which cannot be done later in the year.

The most successful remedies for plant lice are paraffin emulsion and quassia wash. Paraffin emulsion is prepared in the following way:—Mix equal portions of boiling soft soap solution and paraffin together, then churn them up by means of a force pump until a creamy emulsion is produced. When required for use, mix the concentrated soft soap and paraffin solution with twenty times its bulk of soft water.

Quassia wash may be substituted for paraffin emulsion, but it is rather more troublesome to prepare. The usual formula is as follows:—Extract of 5lb. to 10lb. of boiled quassia chips; 6lbs. to 8lbs. of soft soap; 100 gallons of water. The quassia should be boiled separately for two hours in just sufficient water to keep it liquid. The soft soap should be dissolved in water and then added to, and well mixed with, the quassia, the whole being then placed in, and mixed with, 100 gallons of soft water.

If the fruit is fairly forward it is not advisable to employ the paraffin emulsion, as it might affect the flavour.

Early spraying of the plantations with paraffin emulsion is the correct treatment and will prevent considerable loss, which cannot be repaired when once the lice have got a firm hold.*

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* *Copies of this article may be obtained free of charge and post free on application to the Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W.*

CULTIVATION BY THE USE OF DEEP-ROOTING PLANTS.

After a varied agricultural experience of more than forty-five years in India and Scotland, I am thoroughly convinced, from much practical work in the field, combined with studies at home, that our farming system here lacks solidity, and is unable to contend with these times, because its foundation is faulty. The structure raised on it is therefore insecure, and from many points of view. Its foundation ought to consist of a due admixture of decaying vegetable matter or humus, with the mineral constituents of the soil. The latter are sufficiently supplied in the case of most soils; the former is largely wanting in nearly all our arable soil. Without an ample supply of humus in the soil the plant has an unhealthy home, and is therefore liable to disease, and unable effectually to contend with adverse seasons. Without an adequate supply of that humus which is the very life of the soil, both chemically and, what is even of greater importance, physically, the mineral constituents remain largely inert, or, in other words, are only in small degree available as plant food, and it is evident that they are not so, for otherwise mankind would long ago have reduced his land to a state of almost utter sterility.

At a recent meeting 400 Aberdeenshire farmers resolved that one of their three great difficulties (the other two being dear labour and bad seasons) arose from the exhaustion of the soil. And yet, Mr. W. N. Tod, writing in the "Scottish Farmer" of October 19, 1901, shows that even in the first nine inches of one of his fields—"*One of a very poor farm*" (my italics)—there is nitrogen 6.300lbs., phosphoric acid 6.600lbs., and potash 19.200lbs. He further points out that if you consumed half a ton of linseed cake on the land you would expect and probably obtain an increase in

the crops, though you would only have added to the land 53lb. of nitrogen, 22lb. of phosphoric acid, and 16lb. of potash, but then, he adds, you would have supplied these substances in an available form. If, then, these constituents are almost dead in what is called, and, practically speaking, is, an exhausted soil, it is owing to the want of that humus which is the very soul of the soil. In other words, give to it an abundance of decaying vegetable matter, which, when alive, has dissolved and so turned into available plant food the otherwise inert constituents present, and the soil lives ; withdraw this vegetable matter, or reduce it to a low ebb, and the soil becomes almost lifeless. And besides the chemical and physical evils that thus arise, there follows a long train of consequential results, almost any one of which is a serious drawback to agricultural success. I have practically experienced them all, both in the jungles of Mysore and on a property on the slopes of the Cheviots. The exact parallel that exists between experiences so far apart may be interesting and perhaps useful as an illustration.

Many years ago two planters, of whom I was one, cut down the forest and planted coffee. For a considerable number of years all went well. The crops were good, the land was easily worked, and diseases amongst the coffee existed only in an infinitesimal degree. But as time went on the decaying vegetable matter diminished, or, in other words, the soil became more and more mineralised. Then the crops declined, diseases spread amongst the coffee, and the land became more difficult and expensive to cultivate, and quickly hardened after being cultivated. The agricultural chemist was then called in, and he assured us that all we had to do was to restore the elements removed by the crops. But all the artificial manures we applied could not restore the soil conditions with which we started, and therefore did not enable the coffee to contend effectually with disease and adverse seasons. In the end we were obliged to go back to nature—to the soil foundations she laid for us centuries ago —and apply to the land topsoil from the adjacent forest land, swamp soils, and other soil admixtures, in order to

restore to the land that decaying vegetable matter and that physical condition of soil which are the indispensable basis of all successful agriculture.

Just as the planters cleared the forest lands and gradually exhausted their store of decaying vegetable matter, so did the farmers in this country enclose pasture lands and cultivate them in such a way that their humus gradually declined, and all those consequential evils arose from which our agriculturists are now suffering. Then the farmer went to the chemist and, at his suggestion, bought manures which ought to have been, and can be, grown, supplied, and manufactured into plant food gratis on the farm ; and remedies for plant diseases which would either never have arisen or would have existed only to a small extent, had the soil been continuously kept in a healthy condition by a proper admixture of decaying vegetable matter. But in spite of, and often partly in consequence of, the remedies applied, agricultural conditions generally are not improving, much of the soil of Great Britain is in a deplorably impoverished state, the crops are less able to withstand the inclemencies of the seasons, and there are more and more complaints of disease in turnips and of clover-sick soils, while sometimes, as is the case this year, there is an almost complete failure of clover over large tracts of country, a failure which, as I shall afterwards try to show, need never have occurred had our agricultural system been soundly founded. To grapple with these evils the farmer is being taught to rely on costly fertilisers which, should the season be a bad one, must end in loss, or in expensive cures for diseases and insect attacks, which must again and again recur till healthy conditions of soil are provided.

It seems to be generally believed that all that is required to meet existing conditions is to show the farmer by experiments and demonstration how his production may be further increased with the aid of purchased fertilisers. To prove to the farmer how this may best be done a field is taken in hand which has been undergoing the ordinary exhaustive course of British agriculture and divided into a number of plots. Plot No. 1 is marked "No Manure," and the other plots are

dressed with various mixtures of fertilisers, and the results are published. But the conclusions thus arrived at are calculated to mislead rather than to enlighten the farmer, for though the results from the various mixtures used may be a guide in favour of using one rather than another in the case of an exhausted soil, we have under the method of research adopted no test as to whether it would pay to use any one of the mixtures, seeing that the standard for comparison in the "No Manure" plot is so low. Plot No. 1 to furnish a true standard for comparison ought to have consisted of land which had been tilled, drained, aërated, and manured to its lowest depth with tap-rooted plants like chicory and burnet, and furnished with abundant supplies of leguminosæ and of grasses with large and deep root systems. A five-year-old turf from such a composition of plants should have been ploughed up, and well mixed with the soil underneath, you would then have that standard for comparison which the farmer can and should supply, which is the necessary basis of all sound agriculture, and, I need hardly say, the basis that the chemical experimenter should start with when testing his prescriptions for applying either to pasture or arable lands. This is the standard I have formed on my Clifton-on-Bowmont farm.* Let us glance at some of the results from it, and afterwards compare them with the results obtained from the experiments carried out by the Durham College of Science.

The Clifton-on-Bowmont Farm is about a mile from the small town of Yetholm, which contains three inns and a considerable number of lodgings, the place being rather a favourite summer and autumn resort. The town lies in

[*In his work, "Agricultural Changes and Laying Land down to Grass" (J. and J. H. Rutherford, Kelso, price 2s. 6d.), Mr. Elliot describes his system as follows: "The system, as the reader will have seen, is an extremely simple one. It consists of creating, with the agency of large-rooting and deep-rooting plants, a good sod, and then relying on it for the manurial (excepting the turnip manure) and physical conditions necessary for growing two green and two cereal crops, after which the land is again laid down to grass, and the creation of a good sod again commenced. But I must warn the reader, as I have elsewhere done, that this cannot be effected with the aid of grass mixtures commonly used in rotation husbandry, as with these from six to eight years would be required to form a sod, and even then that would be far inferior to the sod which can be produced in four, or even three, years, with the aid of the mixture I have found to be most efficacious."—ED.]

Roxburghshire, and little more than a mile from Northumberland. It is about eight miles from Kelso and four from the Mindrum Station on the Alnwick and Coldstream line. We had upwards of a hundred visitors to this farm this year, mostly from various parts of Scotland, but some from as far south as Sussex. The farm is always open to inspection, the steward shows visitors round, and gives them any information they may require. In my book, "Agricultural Changes," I have fully given our experiences since the farm was taken in hand in 1887 up to October, 1900. My object here is partly to give our experiences up to date, and partly to show that if we certainly require a new system of agriculture we as certainly require a new method of agricultural research. I will particularly call the readers' attention to the following results in the Bank field, because they prove that, as regards grazing and hay, we can now insure a high rate of production in the very worst drought, and thus place farming on an infinitely safer base than the one it at present rests on. The six paragraphs which now follow have been taken from my letter of November 8, which was published in the *Scotsman* of November 11, 1901.

"The Bank field consists of 27 acres, rather more than half of which is poor, stony, and exposed, and in some parts very steep land. The remainder consists of fair medium soil for that part of the country. For the last nineteen years 24 acres of the field have never been manured, excepting with the artificials used with the turnips. The remaining 3 acres once—some years ago—had some farmyard manure. The seed mixture used—and the reason for using it—are given on page 95 of my 'Agricultural Changes.'* It was sown

[* At page 95 of his work, Mr. Elliot says, "The mixtures used in 1900 for the Sheerbrough and the Bank fields were:—Cocksfoot, 14lb.; tall fescue, 7lb.; tall oatgrass, 7lb.; rough-stalked meadow grass, 1lb.; late flowering red clover, 2lb.; white clover, 2lb.; alsike, 1lb.; burnet, 8lb.; kidney vetch, 3lb.; chicory, 3lb.; yarrow, 1lb. Cost, £1 19s. 5d. This last mixture, I think, is an improvement, as, at about the same cost, there is supplied a larger quantity of the most hardy, drought-resisting, early and productive grasses. It is a safe mixture, because the seeds of the large grasses are much less liable to fail than those of the smaller ones, and it is calculated to leave a greater quantity of vegetable matter for the succeeding crops."—ED.]

last year along with a crop of barley. From October 1, 1900, to October 1, 1901, the value of the hay and grazing attained was estimated at £7 3s. per acre. Our estimate has been referred to a tenant farmer, who is employed as a valuator, and his estimate comes to rather more—£7 7s. 6d. per acre. Since October 1 the field has been stocked, and at the present time there are some six lambs per acre, and five calves in the field; but since October 15 the stock has been assisted with two cart-loads of cabbages a day. Should the weather remain open, the field may be stocked for some weeks later. The results prove (1) that a forage mixture can be used which has given satisfactory results in one of the worst seasons of drought ever known; that (2) it will pay to use it even for a single year; and (3) that the clover may be relied upon for a fine yield, even though clover generally may be either a complete or partial failure.

"Clover is a moisture-loving plant. Land well stored with decaying vegetable matter (as mine is) will hold 20 per cent. more moisture than land where the humus is, as is now commonly the case, at a low ebb. The supply of moisture in my land is further aided by the tap-rooted plants like chicory and burnet, which keep up the connection between the dry upper and the moist lower soil, and so encourage the ascent of water from the latter. Plants more often suffer from lack of moisture at critical periods of their growth than from the want of plant food. If my clover—sown at five pounds an acre—was really in excess for the hay crop, while the clover in this district was a failure generally, I can only conjecture that it was because my plants had moisture while the plant generally was starved for want of it.

"The losses, both direct and consequential, that have occurred from the failure of clover are really very serious. The value of the nitrogen alone, which the root nodules absorb from the atmosphere, can hardly be estimated at less than 10s. an acre. Then there is the loss of the clover roots, hay, and aftermath. The scanty yield of the latter was such that it lowered the price of lambs. Considering the reduced number of our sheep in Great Britain it is hardly too much to say that had fields like the Bank field been universal

the price of lambs this year would have risen rather than fallen.

"I now pass to an experiment with potatoes in the case of the Haugh field of 27 acres—a shingley spotted haugh on the banks of the Bowmont—which in our early experience of the farm always suffered extremely from drought. It was laid down in 1893 with one of my mixtures, containing chicory, burnet, etc., and was ploughed up at the close of last year, and partly sown with potatoes and partly with turnips. The former, which were manured with dung and kainit, at an estimated cost of £2 10s. an acre, gave 15 tons per acre. The turnips which had no manure gave 14 tons 6 cwts. Estimating the potatoes at £2 per ton, the result was £1 2s. in favour of the unmanured portion.

"Alongside of the unmanured potatoes a drill of unmanured turnips had been left, the rest of the turnips having been manured with basic slag, nitrate of soda, and sulphate of potash. Both brairded equally well. No difference could be perceived between the manured and unmanured turnips on the 7th of September by Dr. Voelcker (Chemist for the Royal Agricultural Society of England), though the drill was under a disadvantage, owing to being next to the unmanured potatoes. There now seems to me to be a difference in favour of the manured turnips, but the experiment was too limited to be satisfactory, and another experiment will be made next year. The turnips generally are a good crop, and in parts a very good crop, owing to the decaying turf.

"From the results obtained from the system of farming at Clifton-on-Bowmont, it is evident that we can, if we choose, ultimately arrive at the ideal agriculture, where fertility can be continuously increased and fair average crops grown without any fertilisers being purchased. Should these be bought, as they might often be, *in small degree* and with profitable results, the gain will be certain, because the profits on purchased manures will no longer, as at present, be so largely dependent on the season for, as I have shown on my farm, fair crops of all kinds may always be grown in any season, whether it should be over wet or dry, if the land is well

supplied with decaying vegetable matter derived from deep-rooting plants which will at once till, aerate, and manure the soil to the lowest depth that tap-rooted plants can descend. I have emphasized *in small degree* because, when the soil is fully permeated with vegetable matter in various stages of decay, and is thus readily accessible to roots in all its parts, a small application of manure will be as effectual as a larger application would be in the case of a soil in physical condition.

"When then the physical conditions are good you can not only defy the season, but economise manurial applications, and avert the waste that at present occurs from more available manure being put down than suffices for the immediate requirements of the plants. The manure applied in excess of these requirements is liable, I need hardly say, to loss from wash, and from entering into insoluble compounds in the soil."

Let us now contrast these results with some of those given in the work carried on through the Durham College of Science, Newcastle-on-Tyne. I am indebted to the kindness of Professor T. H. Middleton, head of the Agricultural Department of the College, for the report for the season 1901, and for Circulars Nos. 16 and 17, the first giving an account of turnip experiments on six farms in 1900 and the second of the sheep-feeding experiments. These circulars are most admirably drawn up, with diagrams showing the comparative size and yield of turnips grown with and without manure, and also the comparative sizes of the sheep grown on manured and unmanured land, and with and without artificial food. The first circular is most instructive, and contains painful proofs of that deplorably exhausted condition of our soil to which I have previously alluded. The reader will remember that no difference could be perceived by Dr. Voelcker on Sept. 7 between our unmanured turnips and those manured with a complete fertiliser, *i.e.*, nitrogen, phosphoric acid, and potash, and even now the difference in favour of the manured turnips seems trifling. But of the six farms referred to in the Durham College circular three show on the complete manure-plot about double the pro-

duction of the unmanured plot; on two farms the yield was increased nearly threefold on the manured plot, and on one the increase was about sevenfold, while one farm produced 1-30th of a ton on the no "manure plot," against $16\frac{3}{4}$ tons per acre on the plot dressed with a complete manure. But from the results we have obtained at Clifton-on-Bowmont it is evident that had the tests been made on my land the difference in favour of the manured plots would have been so slight that it certainly would not have paid for the cost of the manure—48s. per acre—used in the College experiments.

On turning to Circular No. 17 we shall find a repetition of the same experimental procedure, the standard worked from being described as poor pasture land, valued at 7s. 6d. an acre. The sheep fed on this land presents in the diagram a melancholy appearance as compared with the portly figures of his neighbours in the other diagrams, which represent the results on the sheep from feeding on the pasture dressed with various manurial mixtures costing from 22s. to 36s. 4d. per acre, and in one instance feeding with oilcakes.

But what would have been the result of the comparison had the sheep on the "no manure" plot been fed on pasture raised on previously well-fed soil, and supplied with the fattening chicory, the health-conserving burnet and yarrow, the kidney vetch, clovers, and deeply-rooting nutritious grasses like those used on my farm. If that standard —if that sound foundation—had been built on, the comparative profit from dressing the land with various manurial preparations could have been ascertained; and it is obvious that it could have been ascertained in no other way.

If we turn next to the experiments on the influence of artificial manures on the yield of seed hay, we shall find the "no manure" plots with a production of $35\frac{1}{4}$cwt. to $44\frac{3}{4}$cwt., rising, with the aid of artificials costing 3s. an acre, to 62 and $63\frac{1}{4}$ cwt. But the "no manure" plots ought to have started with a production of 60 cwt. had the plots been on my land, for we have more than once produced three tons an acre on land that had nothing in the shape of artificials or any other manure to stimulate the yield of the hay crop, and we

never think of applying any. In fact, I found our hay crop so heavy without any manure that to reduce the Bank field previously quoted to about 2 tons an acre (it would certainly have given upwards of 3 tons had it not been so treated, and much more had the season been favourable), I grazed the field after harvest and in spring with a heavy stock of ewes and lambs up to the 20th of May. The object of this departure from my usual custom of not grazing previous to haying seeds was to favour the aftermath and subsequent pasture and also to produce fine hay from coarse grasses. The effect of this treatment was most satisfactory as it had the effect of suppressing it so much that there was hardly a single flowering stalk in the hay crop! From the beautiful dark green colour of the field, many farmers thought it had been manured this year with nitrate, and so it has been, most effectually, but from the decaying vegetable matter of the turf which had been ploughed into the land.

After observing the effects produced through the agency of the cheapest and best of all manure merchants—the seed merchant—it has been suggested to me by a competent observer to give up the use of artificial manures. I have as yet no means of forming a decided opinion on the point, and can only say that in the case of land worked on my system, well furnished with vegetable matter, and opened up and manured to its lowest depth with tap-rooted plants, it has yet to be proved how far the addition of artificial manures will be profitable. In this connection I may point out that the chemist is not enough of a farmer and the farmer not enough of a chemist.

One word more. We must recognise the fact that the price of agricultural produce has fallen so low, and the cost of production increased so much, that the farmer can no longer afford to pay for the costly assistance of the manure merchants, nor for costly methods of tillage with the aid of machines like the steam cultivator and other mechanical means for deeply cultivating the soil. His only paying resource is to manure and aerate his land through the cheap agency of tap-rooting plants, which would leave much vegetable matter in the land, and he must, and easily can,

till and deeply stir his land with the aid of the same costless agency. The farmers, I often hear, grudge the cost of seeds to effect these purposes, but by altering their system of rotation the cost for mixtures such as I suggest will not, per annum, exceed what they at present ought to pay for a good mixture for a two years' ley. And then, if it costs rather more than what many a farmer at present pays he will be amply repaid in more certain forage and hay and in turf, which will enable him either to dispense with his manure merchant's bill, or reduce it by a very large amount. The cheapest and best manure merchant is the seed merchant.

ROBERT H. ELLIOT

MANURES FOR A FOUR YEARS' ROTATION.

In the autumn of 1897 the Hampshire County Council leased $2\frac{1}{2}$ acres at Botley as a station for field trials. The land is in the field between and near the junction of the roads leading from Botley to Bishop's Waltham and Botley to Wickham, and is within easy access of Botley station.

During the four years 1898-1901 a four-course rotation of crops has been grown on this land, and eight plots, each a quarter acre in area, were manured in different ways at the beginning of the rotation, one plot only being also manured in the third year. The Botley Farmers' Club has co-operated in the conduct of the trials.

The soil is a useful loam, which is fairly deep, and is suitable for most crops; the subsoil is similar, but is lighter in colour, with a considerable amount of gravel. The previous cropping was as follows: 1897, trifolium, unmanured, which was cut green and carted off; and 1896, potatoes, which received thirty loads an acre of farmyard manure. The particulars of the rotation of crops and of the manuring are shown in the table. All the manures were applied for the mangel crop towards the end of December, 1897, except nitrate of soda, which was applied as a topdressing in the spring of 1898 to the young mangel plants. The manures for the young seeds on plot 5 were applied in October, 1899.

The mangels in 1898 suffered considerably from drought, and, as the crop was deficient on portions of the plots, one rod of each plot was selected, and the roots weighed. The results are calculated to acres, and shown in the table.

The rods chosen had, as far as possible, the same number of roots growing on each rod (the numbers given in brackets indicate the number of roots on each rod). The best crop of mangels was produced by the manures applied to plot 3, and comparing plots 1 and 3, it is to be noted that the addition of common salt has given a considerable increase. It is interesting also to compare the results on plots 1 and 8; the smaller dressing of the same manures on the latter plot has given a rather better result and at a less cost. Comparing plots 6 and 7 the omission of kainit on the latter has not appreciably decreased the mangel crop. The mangel plant was very deficient on plot 5, and somewhat deficient on plots 3, 4, 6, and 7. The combination of manures applied to plot 3 has also given the best result at other centres in Hampshire.

Red wheat ($2\frac{1}{2}$ bushels per acre) was sown on the plots in November, 1898. In this crop, again, it will be seen that where the same manures were applied to plots 1 and 8, the lighter dressing on the latter has given the best result. These two plots gave more wheat than any of the others. The weight of a bushel of wheat was taken as 63 lbs. The crop generally was a light one.

The wheat was sown down with seeds in the spring of 1899, and the young plant looked well on all the plots in the autumn of that year. The best result on this crop was given by the manures applied to plot 5, part of which had been reserved for the young seeds. The results on plots 6 and 7 were satisfactory, and showed that basic slag is the only manure that has given a considerable result on the hay crop three years after its application.

The crop in 1901 was "Tartar King" white oats. It will be seen that the crop on plots 6, 7 and 8 has been substantially increased by the manures applied at the beginning of the rotation, while plots 1, 2 and 3 have smaller but appreciable increases. The crop on the whole was a satisfactory one, and would have been heavier if it had not been for the ravages of birds just before ripening. The weight of a bushel of oats was taken at 40 lbs.

The increase in value of the crops in the four years, after deducting the cost of the manures in each case, is shown

MANURES FOR ROTATION AT BOTLEY.
HAMPSHIRE COUNTY COUNCIL. RESULTS PER ACRE—1898–1901.

Plot.	Manure per Acre, 1898.	Cost.		Mangels. 1898.			*Value of Increase.		Wheat, 1899.			*Value of Increase.		Hay, 1900 (2 cuttings)		*Value of Increase.		Oats, 1901.			*Value of Increase.		Net Gain.		
		s.	d.	tons.	cwt.	lb.	s.	d.	qrs.	bus.	lb.	s.	d.	tons	cwt.	s.	d.	qrs.	bus.	lb.	s.	d.	£	s.	d.
1	2 cwt. Nitrate of Soda 4 ,, Superphosphate 4 ,, Kainit	38	0	16	4	32 (95)	36	0	2	1	60	13	0	2	$1\frac{1}{2}$	2	3	6	5	26	10	1	1	3	4
2	1 cwt. Nitrate of Soda 1 ,, Sulphate of Ammonia 4 ,, Superphosphate 4 ,, Kainit	38	0	17	7	16 (96)	45	0	2	0	1	6	6	2	$3\frac{1}{2}$	8	3	6	3	30	6	1	1	7	10
3	2 cwt. Nitrate of Soda 4 ,, Superphosphate 4 ,, Kainit 4 ,, Common Salt	40	0	20	5	80 (90)	68	6	2	0	4	6	6	2	4	9	9	6	4	24	8	0	2	12	9
4	No Manure - - - - -	—		11	14	32 (81)	—		1	6	8	—		2	$0\frac{3}{4}$	—		6	0	36	—		—		
5	2 cwt. Nitrate of Soda $2\frac{1}{2}$,, Superphosphate ($1\frac{1}{2}$ cwt. to young seeds in Autumn of 1899) $2\frac{1}{2}$ cwt. Kainit ($1\frac{1}{2}$ cwt. to young seeds in Autumn of 1899)	38	0	15	8	64 (61)	30	0	1	6	11	—		3	$3\frac{1}{2}$	68	3	5	6	4	5	10 (decrease)	2	14	5
6	2 cwt. Nitrate of Soda 6 ,, Basic Slag 4 ,, Kainit	41	0	15	8	64 (87)	30	0	1	7	52	5	6	2	$18\frac{3}{4}$	54	0	7	1	10	17	8	3	6	2
7	2 cwt. Nitrate of Soda 6 ,, Basic Slag	30	0	15	2	96 (80)	27	0	2	1	16	10	0	3	$1\frac{1}{4}$	61	6	7	7	2	30	0	4	18	6
8	$1\frac{1}{2}$ cwt. Nitrate of Soda 2 ,, Superphosphate 2 ,, Kainit	23	3	16	8	64 (97)	38	0	2	2	56	15	3	2	10	27	9	8	2	6	36	8	4	14	5

* In making the calculations for these columns, mangels were valued at 8s. a ton, wheat 26s. a quarter, hay £3 a ton, and oats 17s. a quarter.

in the last column. The good results on plot 7 show that basic slag has been most lasting in its action, and that this manure has given the most profitable result. The smaller complete dressing on plot 8 has proved more satisfactory than the large dressing on plot 1.

Samples of the soil were analysed by Dr. Luxmoore in 1898. He found that the soil is very free from stones, and, though it has not much clay, it contains a considerable amount of very fine sand, which gives it a good retentive power. The fine earth of the surface six inches of soil dried in the air contains: nitrogen = ·12 per cent. of ammonia; phosphoric acid = 1·39 per cent. of phosphate of lime; and ·37 per cent. of potash. It also contains 1·18 per cent. of carbonate of lime. It is thus rich in phosphates and fairly rich in potash, but is deficient in nitrogen. The subsoil was found to be poor in nitrogen, but to have a fair amount of phosphates and potash. Notwithstanding the richness in phosphates, however, it will be seen that the phosphatic manures (superphosphate and basic slag) have given very good results. The results on plot 7 rather indicate that kainit, the potash manure, has not been of great advantage.

The geological formation on which this soil rests is the Bracklesham Beds. These beds in many places give origin to good useful sandy loam soils, and compare most favourably with the poor sandy soils of the closely associated Bagshot sands. The market garden land round Botley practically all lies on this formation, and it extends from Botley east almost to Wickham. Near Wickham, however, a poor gravelly soil on the Plateau Gravel is to be found, and at Shidfield the poorer Bagshot sands are developed. The Bracklesham Beds extend also west almost to Romsey, and from there south-east irregularly to Portsmouth. The results of the foregoing trials should give useful indications of the effects of the different manures which have been used on these extensive areas where the soils are derived from this formation.

DOUGLAS A. GILCHRIST.

SWINE-FEVER.

The Board of Agriculture desire to call the attention of farmers and pig-owners to the fact that the operations now being carried on against swine-fever cannot be expected to prove successful unless all connected with the trade in pigs are prepared to give active and vigorous assistance in checking the spread of the disease.

It should be clearly understood that swine-fever is never spontaneous in its origin. Its sole cause is the introduction into the animal system of a healthy pig of the poison from the body of a diseased pig, or from its excreta.

There is reason to believe that the disease is not infrequently conveyed to places at which swine are kept by means of persons who have been in contact with diseased animals elsewhere. Pig-owners should therefore prevent strangers from approaching their pigs, and if the admission of spayers or castrators be necessary, those persons should be required before approaching the animals, to wash their hands thoroughly with soap and water, and to wash and disinfect their boots with a solution of carbolic acid and water or some other suitable disinfectant. Such persons might also with advantage be required to wear, while operating, a waterproof apron, which should be washed and disinfected before the wearer is permitted to approach the animals to be operated on.

The cleanliness of the sties and the feeding of swine on suitable food are very desirable with a view of keeping them in a healthy condition, and of giving them power to resist infection.

Carts, crates, nets, ropes, etc., used in connection with the conveyance of swine should be scrupulously cleansed and

disinfected immediately after use by thoroughly washing them with water and coating them with limewash or with carbolic acid and water, one part of carbolic acid being used to twenty parts of water.

Purchasers of swine should invariably keep newly-acquired animals separate from the home herd for at least a fortnight.

Owners are urged to refrain from moving any swine from off their premises unless they are satisfied that the whole of their stock are free from disease.

Under Section 4 of the Diseases of Animals Act, 1894, every person having in his possession or under his charge a pig affected with swine-fever must keep that animal separate from others which are not so affected. This provision of the Act should as far as possible be carried out directly the presence of swine-fever is suspected, and pigs so separated should be attended by special persons, who should not under any circumstances be allowed to come in contact with other pigs on these premises, or elsewhere.

The Board would also call attention to the importance of the prompt notification of the appearance of any symptoms of swine-fever, where the owner has any reasonable grounds for suspecting that the disease exists. Every person having in his possession or under his charge a pig affected with or suspected of swine-fever is required by law to give notice of the fact with all practicable speed to a police-constable, and there can be no doubt that the success of the measures taken to prevent the spread of the disease will greatly depend upon the promptitude with which this requirement is carried out.

The Board are only empowered to pay compensation for swine slaughtered by their instructions, and slaughter is ordered in the interests of the public alone in cases in which it is considered by the Board to be necessary in order to prevent the spread of disease. Compensation is never paid merely with a view to indemnify a pig-owner for the losses sustained by him by reason of the outbreak of disease amongst his swine.

Although swine may not be moved alive from an infected place, there is nothing in any Order of the Board to interfere

with the discretion of the owner in himself slaughtering his swine for the purpose of sale or otherwise. The carcases can be removed from the premises with the written permission of an Inspector of the Local Authority.

[Copies of this article in the form of a leaflet, and a Welsh translation of the leaflet, may be obtained free of charge and post free on application to the Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W. Letters of application so addressed need not be stamped.]

RUSSIAN LIVE STOCK INDUSTRY.

According to a despatch from Mr. H. Cooke, British Commercial Agent in Russia, Prince A. G. Scherbatoff, at a meeting of the Moscow Imperial Agricultural Society, held on November 12th last, explained the measures taken for the advancement of Russian cattle-breeding, more especially with reference to the organisation of meat exports to Great Britain. Of the three great industrial countries requiring foreign meat, Germany and France maintain a protective customs policy, Great Britain remaining the only country to which Russian meat can be directed with advantage. During the past five years the requirements of the British market have created in Russia a profitable export trade and industry in game, eggs, and butter, to the value of 75,000,000 roubles. For the greater development of the meat export trade, the Ministry of Finance has granted to the Moscow Agricultural Society a sum of 175,000 roubles, of which 65,000 roubles will be devoted to the organisation of experimental exports of meat to Great Britain, and 10,000 roubles to arranging for periodical visits to British agricultural markets of parties of Russian agriculturists and dealers in agricultural produce. Two visits of this kind have now been made; the second party, numbering 20 persons, started from Moscow on November 27th.

In view of these organised efforts to develop the exports of Russian dairy produce and meat to the United Kingdom, special interest attaches to a Return recently published by the Central Statistical Committee of the Ministry of the Interior at St. Petersburg of the results of an inquiry undertaken in 1900 to ascertain the numbers of live

stock in 71 governments of the Russian Empire. The numbers of each class of live stock are given as under :—

	Horses.	Cattle.	Sheep and Goats.	Swine.	Other Animals.
50 Governments of European Russia	19,681,769	32,913,228	49,643,410	11,370,511	166,182
10 Governments of Poland - -	1,393,908	3,003,629	2,548,081	1,259,001	18
11 Governments in Caucasia, Siberia, and Central Asia.	4,886,029	7,670,040	21,003,832	1,294,942	202,879
Total - -	25,961,706	43,586,897	70,647,322	13,924,454	369,079

No comparison is made in the Return with the results of earlier enumeration. The figures for 1900 of the estimated numbers of live stock in the 60 governments of European Russia and Poland compare, however, with those returned for the same area in 1888 as follows :—

	Horses.	Cattle.	Sheep and Goats.	Swine.
1888	20,867,000	27,622,000	49,613,000	10,742,000
1900	21,076,000	35,917,000	52,191,000	12,629,000

From these figures it would appear that in the 60 governments all classes of live stock are now held in larger numbers than in 1888. The most marked increase is in cattle, which are more numerous by 8,295,000 head; sheep and goats follow with an increase of 2,578,000; while pigs and horses number respectively 1,887,000 and 209,000 more than at the earlier date.

In the published results of the inquiry of last year a distinction is made between the numbers of live stock on the estates of private owners and on peasants' holdings,* the

* Prior to 1861 all peasants were serfs of the State, the Crown or the nobility, but by the Emancipation Act of 1861, the peasants were relieved from all personal dependence on the landowners, and endowed, with few exceptions, with the lands they were occupying at the time, and in certain cases, as in the western governments, the peasants' holdings were enlarged. These peasants' holdings, or lots, were portioned out to communes on certain terms of redemption. Thus all the lands in Russia

summary for the 71 governments gives these details as follows :—

	Cattle.	Sheep and Goats	Swine.	Horses.
On estates of private owners	7,483,729	15,348,301	2,313,633	3,692,244
On peasants' holdings -	36,103,168	55,299,021	11,610,821	22,269,462
Total - -	43,586,897	70,647,322	13,924,454	25,961,706

It will be seen from this classification that the proportion on peasants' holdings constitutes 83 per cent. of the cattle, 78 of the sheep, 83 of the swine, and 86 of the horses.

The general features of the live stock industry of Russia differ little in the western half of the Empire from those of the neighbouring countries. Dairying and the fattening of cattle are carried on largely in the north-western governments, in the Baltic provinces, and in Finland, while in Poland and the western governments dairying and pig-breeding are extensively practised. In the less fertile north-eastern governments fattening of stock is less profitable, though the peasants, who own the greater part of the land in this region, breed large numbers of cattle known as Great Russian cattle, and in some districts of this region dairying is a prominent industry. The most important stock-raising districts lie, however, in the southern and south-eastern steppe governments, and also in the Don territory. Here the industry is assisted by extensive pastures, and an abundance of winter keep. It is in this region also that horse-breeding has found its greatest development. In

may now be divided into holdings belonging to the State, to the Crown, to private owners and to peasants.

Of the grand total of peasant lands in the fifty governments of European Russia (the lands belonging to the Cossacks being excepted, as also lands belonging to semi-barbarous tribes in the east of Russia, which enter into the general total of peasants' lands), 216,430,342 acres belonged to communes, and 60,102,830 to villages conducted on the homestead principle, the proportions being as 8 to 1. The communal lands were distributed among 6,387,289 families, each averaging 3·6 males; every family had thus, on the average, 12·5 dessiatines or 33·8 acres; the homestead lands were divided among 1,874,840 families, averaging each 3·7 males, and every family possessing on the average about 11·9 dessiatines or 32·1 acres.

Transcaucasia and in the steppe districts of Central Asia and Western Siberia cattle herding is still the predominant industry of the inhabitants.

The cattle, known as Great Russian cattle, raised in the northern and north-eastern districts of Russia are generally small animals, yielding an average dressed weight of about 250 lbs. They are regarded as more suitable for dairying than for fattening purposes, as the cows have well-developed udders and, when kept in good condition, give considerable quantities of milk. The so-called Kholmogor cattle are raised principally in a district of that name in the government of Archangel. These animals are a cross of the local breed with imported Dutch cattle and are mainly employed for dairying. The larger cattle of the steppe breeds are chiefly utilised for meat production and as draught oxen, the two principal varieties being known as the grey Ukraine and the red Kalmuck. The former are found mostly in the southern and south-western governments, and the Kalmuck breed in the south-eastern governments on the right bank of the Volga. Ukraine cattle are tall, strong animals weighing from 1,000 lbs. to 1,300 lbs. live weight, though well-fattened beasts sometimes run to nearly 2,000 lbs. They are, however, more difficult to fatten than the smaller Kalmucks, and their meat is inferior. The Khirgiz cattle, which are smaller than the Kalmucks, are bred in the governments on the left bank of the Volga and in all the steppe districts of Central Asia. The cows of these three Steppe breeds are poor milkers, yielding scarcely sufficient milk to feed their calves. The average dead weight of steppe oxen is about 620 lbs.

In the Caucasus the principal breeds of cattle are known as the *Tarakamsk*, *Grouzin*, and *Khevsourksosctinsk.* These are used as draught oxen principally, and the cows of the last-named breed are good milkers.

The sheep bred in Russia may be divided into two groups, viz., fine wool or merino sheep, and coarse wool sheep. The great sheep-breeding districts lie in the southern and south-eastern governments of the Empire, the size of the flocks diminishing from south to north, while in the north-eastern

governments the sheep stock relatively to the area and population is very small.

It is estimated that merinos constitute about 30 per cent. of the sheep enumerated. In the south-eastern districts the favourite type is the Electoral or Saxony breed, while in the south-western and southern steppe governments Negretti sheep are the more popular. Another type of merino of Russian origin, known as the *Mazaev* sheep, is bred in some of the southern districts, particularly in the northern Caucasus, and is distinguished for its long silky wool and heavy fleece. There are also many flocks of Rambouillets.

There are several local breeds of coarse-wool sheep which may be divided into four classes, according to whether they are raised for wool, for the skins, for milk, or for meat. Of the sheep grown for wool the principal types are the *Tsigaisk*, which is bred in the south-western governments, and the *Voloshsk*, raised mainly in the south-eastern districts. The fleece of the former weighs about 8 lbs., is yellowish in colour, with wool 1½ to 2 inches long, and contains little fat; the *Voloshsk* fleece is from 4 to 6lbs. in weight, with pure white, coarse wool, 4 to 7 inches long. The *Tsigaisk* is considered to be a good mutton sheep when fattened.

Among the sheep bred for their skins are the *Romanovsk*, bred in the government of Yaroslav, and the *Karakoul* breed of Turkestan, which furnish fine lambskins called *smoushka*. The skins are used for winter clothing, and the *Karakoul* furnishes the material known as Astrakan fur. The best mutton sheep are bred mainly in the Caucasus and in some districts of South Russia. A celebrated type is the fat-tailed sheep of the Kalmuck and the Khirgiz steppes. The average carcase weight of the steppe merinos with fat is about 92 lbs., but the northern sheep give about 46 lbs. dressed weight.

There are two local breeds of swine in Russia, known as long-eared and short-eared pigs, the former being the larger variety. Berkshires and Yorkshires are the principal English breeds imported, but, owing to the small home demand for pork, pig-breeding has not been hitherto a prominent branch of farming, though greater attention is now being devoted

to it in connection with the growth of the export trade in pork.

At the present time Russia's imports of cattle and sheep are in excess of her exports. In 1898 the live stock imported included 53,000 cattle and 379,000 sheep and calves. China furnished a large proportion of the cattle, and the other principal contributors were Persia, Roumania, Finland, and Turkey. The sheep and calves were imported mainly from China, Persia, and Afghanistan. The exports of cattle from Russia in the same year amounted to 11,000 head, of which over 4,000 were sent to Turkey; 1,800 to the United Kingdom, though these animals were not received here alive; 2,000 to China, and 1,400 to Malta. The number of sheep exported was 106,000, mainly to Turkey, China, France, Greece, and Egypt.

The development of an export trade in meat from Russia is likely to be accompanied by a greater demand for animals of British blood for the purpose of improving the native stock of the country. A movement in this direction is apparent in the statistics of the exports of cattle to Russian ports from the United Kingdom. During the past four years the total numbers so shipped have been 378, at an average value of about £20 per head. In the same period 327 British sheep were exported to Russia at an average value of £9 per head; and 306 swine at an average value of nearly £7 each, of which number 196 were shipped last year.

WHEAT GROWING IN THE PACIFIC STATES.

The following account is taken from a bulletin recently issued by the United States Department of Agriculture (Misc. Series, No. 20), dealing with the cultivation of wheat and general agricultural conditions in the Pacific Coast Region of the United States.

The wheat-growing region of the Pacific Coast is located in the States of California, Oregon, Washington, and Idaho. the areas of greatest production being the San Joaquin and Sacramento valleys in California, the Willamette valley running along the west of the Cascade Mountains in Oregon, and the valley of the Columbia and Snake Rivers, in Oregon, Washington and Idaho.

There are two main types of climate in these districts. In the coast regions of Washington, Oregon, and the north of California there is annual rainfall of from 40 to 100 inches, with a moderate temperature. In the two principal wheat valleys of California, on the other hand, not only is the temperature much higher, but the precipitation is much smaller, especially in the San Joaquin valley, where it is less than 15 inches annually. But as nearly the whole of this falls during the winter months from November to May, during which the wheat crop makes its principal growth, the total quantity is, as a rule, sufficient to mature the crop. The conditions about the Snake River, in Idaho and the eastern portions of Washington and Oregon, again, are similar to those in the interior of California, although with a somewhat larger rainfall and lower temperature, but they are much dryer than the coastal regions.

The methods of farming in vogue on the Pacific Coast are

totally different to those in the Eastern States. In the first place much of the agricultural land is in large individual tracts, and although the tendency for the last twenty-five years has been towards a gradual reduction in the area of individual farms and ranches, they are still much larger than the average farm of the East or even of the Middle West.

Another marked feature is the cultivation of large areas for a single product. This is especially true of the wheat farms, where this cereal is raised exclusively without fertilisers, except such as is naturally obtained by summer fallowing. In this territory no good crops for rotation are available, and the limited rainfall in many regions prohibits the planting ot a more fertilising crop. There is, however, in many of the more suitable districts some development of the dairy industry, and irrigation also permits of a certain amount ot more mixed farming.

The use of machinery of great capacity, which means an economy of human labour, but often a waste of grain, is another distinctive feature, particularly of the great Californian valleys. Ploughs are set in gangs, reapers and headers are built with cutting bars of unusual length, and every effort is made to combine several operations in one, thus enabling one man to plough and cultivate the greatest possible area with as many horses as he can control.

The varieties of wheat sown in the Pacific section are also different to those in the East, their peculiar characteristic being a white grain, with a soft and starchy content; and it is said that other wheats imported for seed lose their individuality in a season or two. The principal factor in this change is thought to be the lack of humus in the soil. A large proportion of the more common varieties of the region are of the Club Wheat type, so called on account of the peculiar club-like formation of the head. This formation is ot considerable advantage there, on account of its ability to hold the grain, a very desirable point in this region of very long summers, where the grain, after becoming fully ripe, is frequently left standing for a month or so before being harvested.

Summer fallowing is generally practised over the entire region, largely owing to the fact that there is practically no rotation feasible. Great benefit is derived from the rain of two seasons falling on land which is to bear only one crop, as the greater portion of the land shows great capacity for retaining the moisture that falls and is maintained in good condition, so that early-sown wheat subsequently produces a good crop, even though the rainfall during the growing season be scanty. On an average, there is thus one crop every two years; but sometimes, if sufficient rain falls immediately after harvest, it is possible to raise a second crop. A fallow is sometimes also sown in May after its period of idleness, the young wheat being grazed by cattle during the summer, and the final growth of wheat allowed to start in the autumn.

The straw is frequently burnt on the field, as it cannot be ploughed under and absorbed by the light soil; this saves the ash for the land, but loses the nitrogen. At the same time, the field is cleared of insect pests, which are consequently very rare in this section of the United States.

The greater proportion of the feeding material used for stock in this region is hay made from barley and wheat, which is usually cut "in the milk" and cured in a manner similar to ordinary hay. No accurate estimate of the quantity thus used for hay can be made, as it varies each year with the condition of the grain when at the proper stage to cut, and also with the prices of hay and wheat. Probably 10 per cent. of the entire wheat area is usually devoted to hay.

In the two great wheat valleys of California ploughing is very generally done by gangs of from four to fourteen ploughs, with a six or eight mule team, and to an average depth of about three inches. Attached to the rear of the plough and drawn by the same team is a broadcast seed-sower, which sows the seed as fast as the ground is ploughed. This is usually followed by a harrow, attached to the plough, which harrows in the seed as soon as it is sown. Thus at one time are accomplished the three operations of ploughing, sowing, and harrowing in the seed by one man with his team of eight mules at the rate of ten to fifteen acres per day.

No further attention is paid to the field until it is time to cut the hay or harvest the crop of wheat. On the larger farms ploughing and reploughing is frequently done by large gangs of ploughs or discs, drawn by a traction engine.

The period of growth for crops in California is during the winter season, and the months in which the crop ordinarily grows in the eastern States are in this region the months of suspended animation. There is a long, mild winter, during which the plant has ample chance to grow, and the plant is practically mature before the hot sun of June has an opportunity of doing more than adding the final touches to the ripening and drying of the grain. It is this peculiar hot drying effect of June and July which makes it possible to use the combined harvester and thresher, which could not be used successfully on a grain which was not perfectly dry as well as ripe.

Probably two-thirds of the entire wheat crop of California is gathered with the combined harvester-thresher. The great level fields of the central valley favour the use of the most ponderous machinery. The machine sweeps through miles of grain, cutting swaths from 16 to 42 feet in width, and leaving behind a long trail of sacked wheat ready to be hauled to the warehouse, railroad, or mill. This combined harvester and thresher is usually drawn by twenty-four to forty horses, and sacks from 25 to 45 acres of wheat per day, with four men to operate it; and larger machines will do even more. By its use the grain is threshed directly from the field and left piled in sacks containing about 2½ bushels each. They are left in the field sometimes for weeks without fear of material damage from the weather.

In Oregon there are two chief centres of wheat growing: the Willamette Valley, running along the west side of the Cascade Mountains, and the north-eastern section, which adjoins the richest part of Washington, and where farming conditions are similar to those in the east of Washington. In the Willamette Valley the system of farming resembles more the methods on the other side of the Rocky Mountains. Ploughing is generally deeper, with ploughs set in gangs of two. The seed is drilled in, instead of being broadcasted as

further south; and the harvesting is principally done with a self-binder. The combined harvester is not generally used, as the character of the soil and the smaller size of the farm render it more profitable to use smaller machinery. The dampness of the atmosphere has also an important effect in determining the kind of machinery used, as the grain is not usually dry enough to be threshed at the time of harvesting.

Much wheat hay is sometimes made in Oregon, owing to the low price of the grain of late years. Nevertheless, many farmers in some sections of this State affirm that wheat can be raised and sacked for as little as 20 cents (about 10d) a bushel. Many parts of Oregon are very fertile, and crops from 30 up to 60 bushels per acre, in very favourable spots, are not unknown.

The western section of Washington has the same general characteristics of soil and climate as the Willamette Valley of Oregon, and the methods of farming are similar to those described above. The great centres are, however, the Walla Walla and Palouse districts, with the "Big Bend" (of the Columbia River) towards the east of the State, in which direction the wheat growing section overlaps parts of Oregon and Idaho States (the wheat-growing district of the latter is practically confined to this locality). There are two peculiar features distinguishing this region from that of the Pacific Coast proper, viz., the dryness of the climate and the very finely divided condition of the soil. The region is subject to droughts which frequently set in just before harvest, often shrivelling the grain badly.

The preparation of the soil is generally similar to that in Oregon, although ploughing is somewhat shallower. Upon the larger farms in the flat valleys the combined harvester is utilised, but in nearly all of the Palouse country self-binders are still utilised, principally on account of the early rains, which render the grain too moist to be harvested with the combined machine.

Of the four Pacific States, the largest wheat raiser is California, the average area during the past ten years being 2,700,000 acres, producing 33,300,000 bushels of grain. The

largest average planted in the history of that State was in 1884, when a little over 3,250,000 acres were harvested for grain. The smallest area harvested since 1870 was in 1898, when conditions were so unfavourable during the growing season that a large proportion of the crop was totally abandoned or cut for hay, and only 1,343,000 acres were actually cut for grain. The yield varies considerably from year to year, the average being 14·6 bushels per acre.

Oregon has shown a steadily increasing wheat acreage from 92,000 acres in 1865 to 1,174,000 acres in 1900. The average yield is 17·7 bushels per acre, which, on a mean area of 830,000 acres, gives a total annual production of nearly 15,000,000 bushels.

In Washington, about 700,000 acres are now harvested annually. The area in this State is subject to considerable fluctuations. The yield is as high as 20·8 bushels per acre; this also giving an annual production of nearly 15,000,000 bushels. Idaho harvests on an average a little over 100,000 acres, but this area is now increasing, and amounted to nearly 150,000 acres in 1900. The average total production is 2,366,000 bushels, or a mean of 22·8 bushels per acre.

The four Pacific States together have thus raised, on the average of the past ten years, an annual crop of 65,000,000 bushels, from 4,344,000 acres. This area tends, however, to increase, it having amounted to 5,287,000 acres in 1897, and to 5,162,000 in 1900. The largest out-turn was nearly 81,000,000 bushels in 1899, while in 1900 with a much lower yield per acre it amounted to 73,000,000 bushels.

Transportation of the enormous quantity of wheat raised in the Pacific Coast region has been reduced to a science, and facilities are such that trains can be run from the wheat-fields to tide-water at a very few hours' notice, and a large saving in the handling and warehouse requirements can be made by loading ships directly from the cars. This method of loading is largely practised in California, where elevators as commonly used in the East are unknown, the greater part of the grain being shipped in the identical sack in which it was placed in the wheat-field. In Washington and Oregon, however, the wheat, although brought to the

shipping point in sacks, is run through an elevator, where it is re-cleansed and mixed with other grades to bring it to the required standard, after which it is re-sacked and loaded on the vessels or cars for final shipment.

About 30 per cent. of the wheat raised in the Pacific Coast section—or some 20,000,000 bushels—is usually consumed in the same county in which it is grown, the remainder being sent to various mills throughout the country or exported abroad. The average amount annually exported is 27,450,000 bushels; the principal ports of shipment are San Francisco. Portland, and the two Puget Sound ports, Tacoma and Seattle About half of this is cleared from San Francisco. Some 2,000,000 barrels of flour have also been annually shipped during the past ten years, nearly one-half from San Francisco. The Puget Sound ports have been rapidly coming to the front as shippers of grain and flour, but more especially the latter, and in 1900 they shipped as much flour as San Francisco, from which city the exports of flour have been practically stationary for nearly twenty years.

Reducing the barrels of flour to their equivalent in wheat, it appears that foreign markets are annually supplied with about 36,000,000 bushels of wheat from these Pacific States, the amount sent from the Oregon and Puget Sound ports having increased rapidly, and at the expense of San Francisco, which shipped a considerably smaller quantity in 1891-1900 than in 1881-90. The total quantity of wheat and flour (as wheat) exported does not show very much advance over the previous decade, so that the greater portion of the increase in production appears to have been required locally to meet the needs of the growing population.

AGRICULTURAL AND MISCELLANEOUS NOTES.

Manuring of Essex Pastures.

The Technical Instruction Committee of the Essex County Council have recently issued the first part of a report upon the field experiments conducted by them in that county. This report, compiled by Mr. T. S. Dymond, relates to the treatment of permanent pastures. It covers the work done during the six years 1896-1901, although some of the trials have, of course, only been in progress for a much shorter period. Field experiments are conducted in numerous localities throughout the county, and those dealing with pastures are nine in number.

At two centres (Birch and Burnham-on-Crouch) the object was the determination of the best and cheapest methods of laying land down to grass. Much of the heavy London clay land in Essex, which formerly grew corn, has yielded less profit of late years from tillage crops, and in order to prevent such land from going altogether out of cultivation, it is sometimes necessary to lay it down to grass.

A field was selected for experimental treatment at Birch in 1897. As this investigation is designed to last for some years, no general conclusions can as yet be given, but an outline of the scheme may be quoted. In order to ascertain whether the land required drainage a portion of the field was mole-ploughed. Seven of the most likely kinds of grasses were sown on different plots, as well as mixtures of them with clover and lucerne, while on another plot perennial rye-grass was omitted from the mixture. Part of the field is fed off by sheep (with and without cake), while the remainder receives dung, artificials, or no manure.

At Burnham, the sub-soil is river gravel, and the general design is similar to that at Birch. The results indicate, that a mixture of rye-grass, cocksfoot, timothy, foxtail, and meadow fescue, with leguminous seeds, forms a suitable mixture for laying this class of land down to grass; that to get a good bottom of grass quickly the herbage should be grazed, not mown for hay, but that by doing so twitch is encouraged, while some of the sown grasses more quickly disappear; and that the best means of increasing the fertility of the soil, so far as nitrogen is concerned, is to feed the stock liberally.

The other experiments relate to the best manurial treatment of grass land in general. Three fields were placed under experiment at as many centres during the winter of 1895-6, and three other trials were commenced subsequently. Each experiment was planned on the same lines, the principle adopted being the annual application of small quantities of the chief artificial manures. Lime, where used, was applied at the commencement of the trial, and dung has been given every alternate year. Another experiment, started in 1900-01, at Hedingham, relates to the improvement of grass land for feeding; it is in connection with similar experiments conducted in other counties under the auspices of the Agricultural Department of Cambridge University. Apart from this last centre, the pastures which it is hoped to improve may be divided into three categories, viz., old grass land, new grass land, and the so-called derelict grass land. There are, however, some strongly marked results which hold good for all the experiments, and which may be summarised before considering the manurial and other effects on the particular class of pasture.

Generally, the application of phosphates proved practically essential in Essex to quality and quantity of herbage, on both new and old grass land. Of the two common phosphatic manures, basic slag usually proved the most successful, and for old pasture no other manure seemed necessary. With regard to new grass land, feeding was found to be much more advantageous than mowing the herbage, and better results were obtained by feeding with cake than by applying

nitrogenous manures directly to the field. Taking these results into consideration, it is concluded that the best treatment is to mow and graze the herbage in alternate years; to feed the stock, when grazing, with oilcake or other nitrogenous food, and so manure the land with nitrogen by this means; and to dress the land periodically with basic slag, say 2 to 4 cwts. every alternate year. In no case did the application of lime prove remunerative.

Of the individual centres, Ramsden was an old pasture, upwards of half a century old, and hence comparatively rich in humus and poor in phosphates and potash. Dressings of superphosphate and basic slag proved the best treatment. An interesting point is that the percentage of weeds was found to be nearly inversely proportional to the weight of hay. The best way to eliminate the weeds is to use manures which encourage the herbage: in this respect the phosphatic manures also proved best, augmenting both grasses and clovers. In the absence of nitrogenous manures, however, weeds are somewhat increased, but nitrate could not be used in addition to superphosphate without greatly reducing the clovers.

Two other pastures (Ongar and Nazeing), also fully fifty years old, on London clay, have only been under treatment for a year or two.

Two trials are being conducted on new grass land. One centre, Bulvan, is on the London clay, and was laid down to grass in 1892; the other, Roxwell, is on the boulder clay, and was laid down in 1884. As is usually the case on new pasture, nitrogenous manures have paid for their application, but there is evidently a limit to their profitable employment when used alone. As regards this class of land, basic slag applied at the rate of 2 to 4 cwt. per annum, or a heavier dressing in the first year followed by smaller quantities subsequently, formed the most remunerative treatment. Nitrogenous manures also increased the hay, but as they reduced the proportion of clovers, the application of this substance in the form of cake fed to stock is suggested as preferable. To obtain quickly and maintain a good bottom of grass the field should be grazed every alternate year.

Owing to the high price of corn in the fifties, most of the good old grass land on the heavy clay soil of south-east Essex, which usually formed about one-third of the area of an arable farm, was broken up. Continuous wheat cropping exhausted the accumulated humus, and even the mineral constituents, so that when the price of corn fell it became no longer profitable to cultivate the land. Some of it was sown with grass seeds, and some was allowed to run of itself to grass. In either case the result has been much the same, for unless periodically manured, the better grasses soon disappear, and weeds and wild grasses take their place. Many thousands of acres in this part of the county are said now to be "derelict," except that a few head of stock are allowed to run over the land.

An experiment was commenced at Hazeleigh in the winter of 1898-9 with the object of improving this "derelict" land. The field selected had been sown with grass and clover in 1876: every sown grass has now disappeared, while brambles and weeds spring up in all parts of the field. From the results so far obtained it is clear that the improvement of this "derelict" land is very difficult, and during three years (all of which are, however, held to have been unfavourable) the only manure which paid for its application was basic slag, which may evidently be used with advantage.

MANURING OF RYE GRASS AND CLOVER HAY.

In the course of the past year experiments in the manuring of rye grass and clover hay were conducted, under the direction of the West of Scotland Agricultural College, on seventeen farms in the counties of Ayr, Argyll, Dumfries, Lanark, Perth, Peebles, and Kirkcudbright. The object of the experiments was to determine what quantity of potash could most profitably be included in a complete hay manure; to compare the relative efficacy of muriate of potash and sulphate of potash as sources for the supply of potash to the crop; to compare the relative efficacy of basic slag and super-

phosphate as sources of phosphoric acid; to compare sulphate of ammonia and nitrate of soda as sources of nitrogen; and, more particularly, to discover what advantage might be derived from employing a mixture of these two manures in preference to either of them alone. Some of these points also formed the subject of experiment in 1899.

The general conclusions drawn by Mr. James Wood, M.A., B.Sc., from the results of these experiments are as follows:—

1. The application of suitable artificial manures to rye-grass and clover hay produces a large and profitable increase of crop, even in a season when the crop is naturally heavy.
2. Potash forms a necessary and effective constituent of a hay manure on clay soils as well as on light and moorish soils.
3. The most profitable quantity of potash to apply in a complete hay manure, such as was employed in these experiments, is that supplied in about 1 cwt. muriate of potash of 75 to 80 per cent. purity.
4. Potash is equally effective whether applied in the form of muriate or sulphate.
5. A mixture of nitrate of soda and sulphate of ammonia has not proved superior to either of these manures used separately.
6. In the comparison between nitrate of soda and sulphate of ammonia no uniform superiority of the one over the other has been shown in the past year.
7. Farmyard manure gives a much larger crop and a more profitable return when nitrate of soda or sulphate of ammonia is applied with it than when it is applied alone.

LUCERNE AS A FERTILISER.

The United States Department of Agriculture has recently drawn attention to the great value of lucerne as a feeding stuff and fertiliser. This fact, which had already been esta-

blished by long practical experience, has been confirmed by recent scientific investigations at various experiment stations. The results obtained have moreover not only shewn the value of lucerne as food for all kinds of stock, including pigs and poultry, but have also thrown considerable light upon the stage of its growth when the plant contains the greatest amount of nutritive matter and the best method of making it into ensilage.

It has been shewn at the Wyoming Agricultural Station that the crop is especially valuable for increasing the nitrogen in arid regions, for improving the tilth, and for destroying weeds by crowding them out. Land where lucerne had been cultivated for five years produced more wheat, oats, and potatoes than land which had previously grown potatoes and grain, the increase per acre being estimated at £2 2s. for wheat and 37s. for the other crops. The increased yield and value were, moreover, produced with absolutely no manuring except the lucerne stubble and roots which were left when the crop was cut for hay each year.

Like other leguminous plants, lucerne is able to draw from the air the larger part of its nitrogen and thereby to increase the nitrogen in the soil. In some experiments at the Colorado Station a ton of lucerne was found to contain 44 pounds of nitrogen, 8·27 pounds of phosphoric acid, 50·95 pounds of potash, and 40 pounds of lime. Where lucerne is ploughed in as a green crop the fertility is considerably augmented, and even where the crop is harvested the tilth and fertility of the soil are improved by the shading of the ground and the decay of the large, deep-growing roots of the plant.

[*U.S Department of Agriculture, Farmers' Bulletin, No. 133.*]

LOSSES IN THE PREPARATION OF SILAGE.

The following information relating to ensilage is taken from an article by Professors Babcock and Russell, which

has been published in a recent report of the Wisconsin Agricultural Experiment Station.

When green plants are cut and placed in a heap, certain physical and chemical changes occur, the mass undergoes a rapid evolution of heat, and in a short time a marked chemical decomposition is observed. These changes take place when the material is stored in closely compacted stacks, in pits in the ground, or in air-tight receptacles. They are accompanied by a loss of dry matter, which is greatly increased by access of air, and various organic acids are formed, which give the silage a more or less sour taste. In practice, these losses are subject to much variation, ranging from 3 to 40 per cent., according to the completeness with which air is excluded. In perfectly tight silos the losses are reduced to a minimum. Where the construction of the silo is such as to permit leakage of air, moulds and other ferments develop rapidly, resulting in largely increased losses. The losses may therefore be divided into (1) those which are unavoidable, even in air-tight silos, and (2) those incident to the faulty construction of the silo.

As a result of their investigations into the causes and processes of the changes which occur in the formation of good silage, Professors Babcock and Russell state that these changes are not due wholly to the action of bacteria as commonly supposed, since it was found possible to make silage of good quality and aroma without the presence of bacteria and without the generation of a temperature exceeding 75° to 80° F. The changes which take place in the silage are believed to be due to changes occurring in the tissues of the ensiled material.

The unavoidable losses in silage are due to the formation of water, carbon dioxide, and volatile organic acids. As these changes are prolonged in the more active and immature tissues in comparison with the more mature, the losses in the first case are greater.

The avoidable losses, on the other hand, are due mainly to the decomposition of organic matter, induced by the development of bacteria and moulds, the growth of which is greatly facilitated by the admission of air as a result of imperfect

construction of the silo. This imperfection also prolongs the direct respiration of the plant tissues, thereby increasing the amount of water and carbon dioxide produced.

Professor King has also shown that the unavoidable losses, *i.e.*, "the loss of feeding value which cannot be prevented in the interior of a silo with air-tight linings when filled in the best practicable manner," may be reduced to as little as 2 to 4 per cent., and in good practice need not exceed 4 to 8 per cent. The main precautions to be observed seem to be a well-constructed air-tight silo, the use of mature crops, and careful packing, so that as little air as possible is enclosed in the mass when the silo is filled.

[*U.S. Department of Agriculture, Farmers' Bulletin, No.* 133.]

FEEDING WHEAT TO STOCK.

In connection with the Exhibition at Paris last year there was held an international congress upon the feeding of live stock. A report on the subject of wheat as a ration for animals was drawn up by M. Vacher, and a summary of this report is contained in the Belgian *Bulletin de l'Agriculture*.*

Wheat may form an excellent ration for stock, but how far it is economical depends upon the price of the grain; and the question whether to put wheat on the market or to use it on the farm is one which must be determined according to its value at the time. Experiments in five different ways of feeding wheat are noticed.

1. *Raw Wheat.*—Wheat fed in the natural state may suit the horse, which, by reason of its perfect mastication, digests almost the whole of the nutritive elements (according to experiments by MM. Müntz and Girard). Swine also assimilate it well, but it is not economical in the case of cattle, which only utilise 40 or 50 per cent. of the nutritive elements.

2. *Flour.*—If steamed before use, wheat flour becomes very digestible, but it is apt to form a paste in the mouth, so that

*1901. Vol. XVII., part 3.

the animals dislike it after a time. The cost of milling is also a consideration.

3. *Crushed Wheat.*—This form is preferable to the two first, as not involving the objections mentioned above, but to be economical the grain should be crushed by mechanical power.

4. *Bread.*—This method of feeding wheat has proved satisfactory, both for horses and for fattening other farm animals.

5. *Cooked Wheat.*—This method is the one most approved of by M. Vacher, who considers it superior from the double point of view of economy and digestibility. In cooking the wheat, the grain is put to steep for some time beforehand, and then cooked in a food-boiler until it can be easily crushed between the fingers. It is then taken out of the boiler and allowed to cool and become slightly acid during twelve hours. Before giving it to the cattle a certain quantity of warm water is added to restore its volume and to facilitate ingestion and digestion.

Experiments in feeding cooked grain to stock have been carried out in France by M. Pluchet for a number of years.* His first trial was made in 1893, in which year, owing to the low price of bread, he changed the diet of his horses, which were exclusively engaged in farm work, replacing 8 lbs. of oats by about 6½ lbs. of full wheat bread and ¼ lb. of cooked linseed, with results which he considered satisfactory. When wheat prices subsequently improved, he substituted rye for wheat, and for the last six years the daily ration of his horses has been approximately 22 lbs. of straw, 16 lbs. of chopped fodder, 10 lbs. of oats, and 6½ lbs. of cooked rye. This ration has, he states, given him complete satisfaction. In calculating the economy, however, no allowance has been made for cooking the rye (or wheat), because it is done by utilising the escape of steam (which would otherwise be wasted) from an engine employed to work various machinery employed on the farm.

In 1899 the price of wheat again fell, and has since been

* *Bulletin des Séances de la Société Nationale d'Agriculture de France.* Vol. LXI., 1901, No. 4.

(in France) about 31s. to 32s. per quarter. M. Pluchet thereupon undertook an experiment in feeding some of the wheat he had grown on his farm to his cattle. In the first place, the wheat was thoroughly cleaned in a winnower, which separated the lighter grains in the proportion of about 18 per cent. By this means, from 200 lbs. of wheat he obtained 162 lbs. of very fine wheat worth 1s. 4d. per quarter more, and 37 lbs. of light wheat for use as cattle food. This cleaning process having enhanced the value of the wheat sent to market, he was able to reckon the cost of that fed to the stock at about 27s. per quarter only (but making no allowance for the cost of cleaning).

Thirty oxen were set apart in January to be fattened for the butcher, and divided into lots as similar in weight, etc., as possible, for the purpose of the experiment. The first lot received 4·4 lbs. (afterwards increased to 6·6 and 8·8 lbs.) of cooked wheat per head, and the second had the same quantity of linseed cake, in addition to a general ration of 132 lbs. of pulp from a sugar refinery mixed with wheat husks, and about 15 lbs. of clover silage. The gains made by the animals, which were weighed at intervals, were at first in favour of those fed with wheat; but subsequently the cake-fed beasts improved the more rapidly, and when they were finally taken by the butcher the gains made by the two lots were exactly equal. There was, nevertheless, an economy in favour of the cooked wheat of about 14s. per head (at the prices then current), with the additional advantage, in years of superabundance and low prices, of withdrawing from the market a certain amount of low grade wheat and delivering only corn of superior quality.

Pig-feeding Experiments in the United States.

In Vol XIII., No. 1, of the "Experiment Station Record" of the United States Department of Agriculture, summaries are given of reports of certain experiments in pig-feeding carried out in the United States.

Among these were experiments conducted by Messrs. W. L. Carlyle and A. G. Hopkins at the Wisconsin Station on the feeding of pigs for the production of lean and of fat meat. Two lots of eight pigs each were used to investigate this question. During the eighteen weeks of the test, the first lot received maize meal and skim milk in equal proportions, while the second lot were supplied with wheat middlings, and ground peas in equal parts, mixed with an equal amount of skim milk. On the expiration of the eighteen weeks the pigs were slaughtered, and a block test made. It was found that in the maize-fed lot the average percentage of intestinal fat to dressed weight was 2.2 per cent. as against 2 per cent. in the pea-fed animals, and a similar, but more pronounced difference was also noticed in the case of kidney fat found in the two lots. The fat from the pigs fed on peas and middlings was found to contain a much larger percentage of water than did the fat of those fed on maize meal. This result is of some importance, as it shows that the maize meal diet is the more likely to produce fat suitable for lard-making purposes. It was further noticed that, as regards the amount of blood, and the weight of intestines, stomach, liver, and kidneys, the pea-fed pigs surpassed the maize-fed animals.

Experiments, of which a report was made by Mr. Carlyle, were conducted at the same station to test the value of rape as a food for growing pigs. Thirty pigs, averaging six months old at the commencement of the test, were pastured for two weeks on about four acres of rape. There were no bad effects, but the pigs lost weight. The results indicated that a ration of rape alone fed to pigs for a period of two weeks was not sufficient to supply the food necessary for their support.

At the Wisconsin Station, Mr. W. A. Henry continued earlier work in comparing the values of whole maize and maize meal as a food for fattening swine. The experiment lasted fourteen weeks, and included two lots of fourteen pigs each. Wheat middlings were fed with the corn, and constituted one-third of the ration. In the result, the first lot, on whole maize, required 5·59 lbs. to make 1 lb. of gain, and the second lot required 4·79 lbs. The results have varied in

different years, and the author believes that the tests must be continued before definite conclusions can be drawn.

RIPENING OF CREAM.

The *Centralblatt Jur Bakteriologie* contains, in Nos. 21 and 22, 1901, an account of detailed investigations conducted by Messrs. H. W. Conn and W. M. Esten into the ripening of cream. The conclusions to be drawn from these experiments are summarised by the authors as follows :—

Milk as it is drawn from the cow contains great quantities of bacteria; most of these are miscellaneous forms of liquefying bacteria and other non-acid species. At the outset the number of acid bacteria is very small.

All species of bacteria increase during the setting of the milk for the separation of the cream.

For a few hours the alkaline and other miscellaneous bacteria increase rapidly, while the lactic bacteria are hardly evident.

After about 12 hours the lactic bacteria have increased so much as to be as numerous as the others, and from this time on they continue to increase with great rapidity until a maximum is reached at about 48 hours; after this the numbers gradually decrease, and they finally practically disappear.

The ripened cream contains prodigious numbers of bacteria, larger numbers than are known in any other natural medium. They are, however, nearly all lactic bacteria.

After the first 12 hours all species of bacteria except the two lactic species decrease in relative numbers, and finally absolutely disappear.

The two commonest species increase regularly from the beginning of experiments until the maximum.

The cream which is received by a creamery is already half ripened, as indicated by the immense numbers of bacteria it contains. All the changes which occur in the cream under the influence of the miscellaneous bacteria have already

occurred, and the ripening that takes place in the creamery is due wholly, or almost wholly, to the growth of the lactic bacteria.

A ripened cream is almost a pure culture of acid bacteria, but this does not mean that ripening has been produced by these acid bacteria alone.

That the lactic bacteria play an important part in the ripening is perfectly evident; that they are the sole cause of the changes occurring in the ripening is not so evident.

The peculiar flavour of June butter, which is so much desired by the butter-maker, is not due to the development of the common lactic bacteria. Butter ripened during the winter months develops the two species of lactic bacteria as abundantly and as quickly as does that ripened in June, but the flavour does not make its appearance. In the last three experiments recorded, the June flavour was very noticeable in the cream, but the development of the acid bacteria, or the two species referred to, was practically the same as in all of the previous experiments. The June flavour, therefore, cannot be due to these common lactic bacteria.

To what this June flavour is due Messrs. Conn and Esten are not as yet satisfied. Whether it will prove to be due to the large growth of miscellaneous bacteria during the first few hours of ripening, or whether it is due to a difference in the chemical nature of the cream, remains for further experiments to decide.

EXPERIMENTS IN THE PRESERVATION OF EGGS.

During the past three years some interesting experiments in the preservation of eggs have been carried out by Mr. F. T. Shutt, Chemist to the Experimental Farms of the Canadian Ministry of Agriculture. The eggs used in these investigations were quite fresh, being supplied by the Poultry Department of the Experimental Farm, Ottawa, and taken from the nest within a few hours of being laid. In the experiments of 1898-99 some of the eggs were treated in the first week of

October, and tested at the beginning of the following March; while a number were retained under experiment until December, 1899, a period of fourteen months. The preservatives employed were saturated lime-water; lime-water plus 10 per cent. of common salt; 10 per cent. solution of water-glass (sodium silicate); 5 per cent. glycerine; and distilled water. Some of the eggs were left in the solution for a few days, while others were left in the solutions throughout the entire period of the experiment. The coating of the eggs with paraffin was also tried. After a careful examination of the eggs, including poaching, it was concluded that saturated lime-water gave by far the best results.

During the past year several of the above-mentioned trials were repeated. The efficacy of certain other methods for egg preservation that have received attention from time to time in the Press was also tested. The experiment was begun on June 5th, and the eggs examined on December 10th Three eggs from each experiment were poached.

Briefly stated, the results were as follows:—

1. Eggs immersed continuously in saturated lime-water. Outward appearance excellent; yolks non-adherent, of good colour and fairly globular; albumen somewhat more limpid than in fresh eggs, and slightly discoloured; a very slight "stale" odour; air space normal; poached eggs free from all objectionable taste and of good appearance.

2. Eggs first smeared with vaseline and immersed continuously in lime-water. Externally somewhat darker than the foregoing and rather greasy; yolk globular and of good colour; albumen a very faint yellowish tint and somewhat limpid; a very slight "stale" odour; air space normal; poached egg very similar to that in 1.

3. Eggs continuously immersed in 2 per cent. silicate of soda. External appearance good, and very similar to that of eggs in lime-water; yolk globular and of good colour; albumen but very slightly discoloured, almost normal marked odour of a "soapy" character, which is further developed in poaching; air space normal; poached egg of very good appearance, but with faint "stale" flavour.

4. Eggs continuously immersed in solution of 5 per cent.

of gum arabic and 1 per cent. formalin. Outward appearance inferior to those in foregoing tests; yolks attached to shell; albumen decidedly discoloured; odour not marked; air space normal; appearance of broken egg much inferior to those in preceding test; developing marked flavour on poaching.

5. Eggs continuously immersed in 5 per cent. gum arabic, plus 5 per cent. salicylic acid. Preserving solution quite mouldy and with a very bad smell. Egg-shells quite soft. The broken egg, though not unsightly, had a most nauseating odour, and was quite unfit for food.

6. Eggs continuously immersed in 5 per cent. dextrin plus 5 per. cent salicylic acid. Preserving solution very mouldy and smelling badly. Egg-shells soft, and contents unfit for food.

7. Eggs dipped momentarily in dilute sulphuric acid, then washed and stored in a large bottle. All exceedingly bad; contents very offensive.

8. Eggs dipped momentarily in sulphuric acid, washed and dipped in alkaline ammonium oxalate, then stored in large bottle. All the eggs very bad, and contents offensive.

These experiments corroborate many of the results obtained in the previous year, and are held to afford further proof of the excellence of the eggs preserved in saturated lime-water. Mr. Shutt thinks that, on the whole, 2 per cent. sodium silicate gives better results than the 10 per cent. solution, but he is also of the opinion that lime-water is superior to both as an egg preservative. "Moreover, it is cheaper and pleasanter to handle."

CORN WEEVILS (*Calandra Granaria*).

This beetle and the closely related Rice Weevil (*Calandra Oryzæ*) are more destructive in granaries, stores, and barns than any other known corn pests. But the ravages of this insect are not confined to stored corn; for cereals in transit are also liable to its attack, and cargoes of corn from abroad

are sometimes destroyed by it. A few cases have been recorded of cornfields situated near mills in Great Britain being attacked by this pest.

The beetles lay their eggs in the corn, and the maggots feed inside the grain, where they also pupate. They breed fairly rapidly in this country, and may attack stored produce other than cereals. Reproduction chiefly takes place in spring and summer, but it may continue throughout the year in mills. The warmer the temperature, the more rapidly does this pest breed.

In cases where the beetle attacks stored grain, if the storehouse or barn is fairly airtight it should be fumigated with bisulphide of carbon. All openings must first be closed as far as possible. The chemical should then be placed in flat saucers about the surface of the grain, in the proportion of 1 lb. of the bisulphide of carbon to every 1,000 cubic feet of space, and allowed to evaporate for 24 hours. The heavy fumes will penetrate through the grain and kill all forms of life, but will not harm the grain itself. At the end of the 24 hours the building should be well ventilated, and the grain turned over. Where practicable, the most satisfactory method is to fumigate the grain in closed bins. In such cases, the bisulphide should be used at the rate of 1 lb. to every 100 bushels of grain, and left to evaporate for 24 hours.

It must be borne in mind that bisulphide of carbon is inflammable, and that both the liquid itself and its fumes are poisonous.

Barns should be kept well cleaned, lighted, and ventilated, all refuse should be burnt, and the walls, ceilings, and floors washed with whitewash and soft soap; while the grain should be kept in bulk and constantly stirred.

Infested grain may be given to poultry. It would not harm the birds, and they would devour the insects as well.

LYGUS ON CHRYSANTHEMUMS.

Specimens of chrysanthemums injured by a species of bug, *Lygus pratensis*, belonging to the order *Hemiptera heteroptera*, were sent to the Board in October last. This species is very

common and widely distributed in the British Islands, and is sometimes harmful to various garden plants. No record of their attacking chrysanthemums was hitherto known, although the correspondent forwarding the insect states that they were not injuring any other plants. Several other species of *Lygus* are injurious, including the so-called "potato bugs," *L. pabulinus* and *L. contaminatus*. These bugs injure the plants by puncturing stem, leaf, and blossom, and sucking out the juices.

The life-history of *L. pratensis* is not known; but eggs are usually laid upon the plants on which the insects feed. The larva is much like the adult, but has no wings; the pupa differs in having two bud-like processes—wing-buds—on each side of the body. These plant bugs are injurious in all three stages. Some winter as eggs, others hibernate among rubbish, in hedgerows, etc.

The only treatment of any avail against these creatures is to collect them by "jarring" the plants over tarred boards held on each side, and treatment by washing. The only washes of any use are soft-soap washes, especially paraffin emulsion with an extra 3 lb. of soft soap to the 100 gallons. To be of much service the wash should be used when the insects are in the larval or pupal stages. Where the insect is found to hibernate as an adult, steps should be taken to destroy it before the spring; if it passes the winter in the egg stage, the plants should be sprayed with paraffin emulsion as soon as the young appear.

WOOD WASPS.

The Board have received reports of damage caused to fir trees in the neighbourhood of Bath by the two common British wood-wasps known as the Steel Blue Sirex (*Sirex juvencus*) and the Giant Sirex (*Sirex gigas*).

These flies chiefly attack damaged or unhealthy trees. They burrow into the timber, and their larvæ remain and pupate in the wood, where they may be found in the winter.

There is no remedy for the Sirex flies, but their increase may be checked by clearing out all diseased and damaged timber. Infested trees should be cut down and burnt in the winter, when the larvæ and pupæ are safely housed in the wood. Such timber should not be cut up into posts and rails, as is frequently done, for many of the larvæ and pupæ will hatch out even after the wood has been creosoted.

CULTIVATION OF BARLEY.

At a meeting of the Rye District Farmers' Club on November 6th, Principal A. D. Hall, of the South-Eastern Agricultural College, delivered the opening lecture of the season on the "Growth of Malting Barley." The lecturer began by admitting that his subject did not perhaps appeal to a large number of the members of the club, because there was not much malting barley grown in the district; still, many men grew barley, and might effect a considerable improvement in their product if they gave more consideration to the requirements of the brewer. The brewer maintained that much of the barley grown in England could only be used with the help of sugar and other substitutes. Whether that were so or not, there was, at any rate, very considerable difference between the best barley, for which brewers could give a good price, and the ordinary article. Roughly speaking, besides the skins, barley consists of starch and of albuminoids or compounds containing nitrogen. The brewer wants as much starch as possible, because he can turn it first into sugar and then into alcohol. He does not want the albuminoids, for if the beer contain any quantity of them it will not keep well. A high proportion of starch in the grain generally means a plump corn and a thin, wrinkled skin, and such barley was most likely to be attained when the period of growth was long and the ripening steady and thorough. Brightness of colour in the sample was also important, not only because light-coloured beers were most in fashion, but also because bright colour accompanied good growth and management.

Turning now to the farmers' side of the question, the lecturer explained that the advice he was going to offer was based on two sources—experiments carried on by the South-Eastern Agricultural College and the valuable records that had been accumulated by the authorities of the Brewers' Exhibition.

As to the kind of barley to grow, there was little doubt but that in the south of England a barley of the Chevalier type was best. Kiln-drying of the seed before sowing had often been advocated so as to secure a more uniform germination, which was just as important to the barley grower as to the maltster who "sweated" his corn. In these experiments, however, there had been little result attained by kiln-drying, probably because in each case the great heat and drought prevalent at the time when the seed-corn was harvested had more than ripened the grain. Better results from kiln-drying were probable when the seasons became more rainy again.

One of the most striking facts brought out by the Brewers' Exhibition was the importance of early sowing; the prize barleys were generally sown early in March, or even in February. This year had been exceptional—the gold medal barley had been sown as late as April 26th; but then the spring had been such as to render the early sowing of corn almost impossible.

Early sowing further made it important to look into the question of the "tilth" upon which the barley was to come. They would find that the finest barleys rarely came after roots, although barley after roots folded on the land was perhaps the commonest rotation. Generally the best barley was obtained after a straw crop; barley after wheat following a clover ley could be trusted on good land to give a fine sample of barley. In some cases the land was not strong enough to carry two straw crops running, so some manure was wanted for the barley. This should be mainly phosphatic, 3 cwt. of superphosphate with not more than 1 cwt. of nitrate of soda or a little less sulphate of ammonia, according to the amount of lime in the land.

When barley was grown after roots folded off, the sheep left too much rapidly available nutriment in the land, espe-

cially too much nitrogen and potash. This resulted in a flaggy, soft growth that was hard to ripen thoroughly, and apt to go down. At the same time the sheep were often on the land so late that the early sowing necessary for the best barley could not be secured; the folding, too, left the land uneven. In the experiments upon this crop made by the South-Eastern Agricultural College they had tried if they could not improve the quality and stiffen the straw by using superphosphate to balance and make an all-round manure ot the nitrogen and potash the sheep gave back to the soil. They had attained a certain measure of success—for example, the gold medal barley at the Brewers' Exhibition of 1900 contained 63 per cent. of starch and 1·2 per cent. nitrogen; the second prize 62 per cent. starch and 1·1 per cent. nitrogen, whereas the average of twenty-one barleys grown after roots showed only 58 per cent. starch and 1·55 per cent. nitrogen. A dressing of 3 cwt. per acre of superphosphate was always found to reduce the proportion of nitrogen and slightly increase the starch. Tried on a large scale the improvement was manifest to the practical man, and the barleys that had been grown with superphosphate were valued at from 2s. to 5s. per quarter more than those without. Salt, on the contrary, always made the barley worse; less starch and more nitrogen was the result. As regards the straw, the superphosphate did not help, but the lecturer considered the experiments had shown, both on a small and large scale, that a dressing of 3 cwt. per acre of superphosphate produced a paying return both in the yield and the malting quality of the barley grown after roots.

MANURIAL REQUIREMENTS OF DIFFERENT CROPS.

The Department of Agriculture and Technical Instruction for Ireland have recently issued a leaflet (No. 17) dealing with the applicability of different manures according to the kind of crop to be grown. It is pointed out that, although good crops can be grown with artificial manures alone, the

chief use of these fertilisers lies in their supplying that particular constituent of the plant's food which happens to be most deficient in any given soil; the backbone, as it may be termed, of the manure being formed of dung. Some suggestions are given as regards the manuring of the principal crops grown in Ireland.

An important constituent of the food of turnips is phosphates, but in many soils an adequate supply of this ingredient is lacking. The requirements of the crop, however, in this direction, where it gets a fair dressing of dung, may generally be satisfied by the application of 4 cwts. of 25 per cent. superphosphate per acre. On stiff, heavy land an addition of nitrate of soda is also advisable. When turnips are grown without dung, a mixture of 4 cwts. of 25 per cent. superphosphate, 2 cwts. of bone flour or fine bone meal, 3 cwts. of kainit, ½ cwt. of nitrate of soda, and ½ cwt. of sulphate of ammonia should suit most soils.

Although mangolds resemble turnips in the matter of cultivation and in the purpose for which they are grown, they differ entirely in their manurial treatment. Nitrogen is the ingredient which the mangold has most difficulty in obtaining, and this should be applied in the form of nitrate of soda after the mangolds are thinned. The quantity required will vary according to the condition of the land and the amount of farmyard manure supplied.

The potato is a general feeder and requires a complete manure. A mixture of 1 cwt. of sulphate of ammonia, 4 cwts. of 25 per cent. superphosphate, and 1 cwt. muriate or sulphate of potash has been found to give very good results. These proportions should be varied according to the condition of the land and the amount of dung applied.

The oat crop requires in the first place an adequate supply of nitrogen for its growth; but this element seldom exists in the soil in proper quantities and in a suitable form for assimilation by the plant. The deficiency may, however, be supplied by the application of nitrate of soda or sulphate of ammonia. On land in fair condition 1 cwt. of nitrate of soda or of sulphate of ammonia will usually give a profitable return; but poorer classes of soil will probably require 2 cwts. of super-

phosphate, and on very poor lea land 2 cwts. of kainit in addition would be necessary. When sulphate of ammonia is used, it should be sown about ten days before the seed; and nitrate of soda should not be applied until after the oats have brairded. Superphosphate and kainit should also be applied ten days or so before the seed, and where sulphate of ammonia is used they can all be mixed together and sown at the same time.

Meadow hay requires a liberal supply of nitrogen for its growth. This ingredient is best supplied through the agency of farmyard manure; or failing this by means of a mixture of 1 cwt. nitrate of soda, 2 cwts. 25 per cent. superphosphate, and 2 cwt. kainit. The two latter should be applied early in the spring, and the nitrate when the growth first makes its appearance.

Dung is the best form of manure for cabbages, but, in addition, a little nitrate of soda should be sprinkled about the roots of the plants after they have commenced growing.

The greatest care should be taken to see that all manures are thoroughly mixed together, and all lumps broken, so that the manure may be evenly distributed throughout the soil. Basic slag should not be mixed with any manure containing ammonia or soluble phosphate, and nitrate of soda should not be mixed with superphosphate or dissolved bones, unless they are to be sown immediately, otherwise part of the nitrogen may be lost.

Farmers and Repayments of Income Tax.

The Commissioners of Taxes hold meetings after the expiration of the year of assessment for the purpose of hearing appeals by persons who have paid income tax in the previous year under Schedules B. or D. on amounts in excess of the actual profits made in that year.

Persons who have sustained a loss by farming operations may obtain a repayment of the income tax paid under Schedules B. or D., and also of a proportionate amount of the tax paid in respect of their incomes (if any) derived from sources other than from occupation of land. Persons who desire to appeal with a view to obtaining repayment on the

ground of loss or diminution of profits must apply to the Surveyor of Taxes within six months from the 5th of April for information as to the time and place of meeting of the Commissioners.

The printed form of account of profit and loss for the use of farmers shewn below has been provided by the Commissioners of Inland Revenue, and may be obtained on application to any Surveyor of Taxes. The Commissioners of Inland Revenue have instructed their officers not to object to the admission of farming accounts made up annually from Michaelmas Day instead of from Lady Day.

Form of Account of Profit and Loss for the Use of Farmers.

INCOME TAX.

No. 79D. Farmers' Appeals.

Parish of ....
County of ....

STATEMENT of PAYMENTS and RECEIPTS in respect of Lands in my occupation for the purposes of HUSBANDRY (particulars of which are entered at the back of this form) for the year ending........................ ......, 190....

PAYMENTS :—	£ s. d.	RECEIPTS :—	£ s. d.
†Value of *Stock* (live and dead) and *Produce* at beginning of year - - -		Live Stock and Wool sold -	
Live stock bought - -		Corn and Seeds sold - -	
Corn and Seeds bought for seed - - - - -		Dairy Produce and Poultry sold - - - - -	
Feeding Stuffs, Oil Cake, aud Manure bought- - -		Other Produce, including Hay, Straw, or Roots where sold- - - -	
Rent (including Tithe) - -		Labour, Stock, Implements, &c., hired out - - -	
The amount of the Schedule A. assessment (*i.e.*, the ne value assessed, not the Duty paid) where the occupier is also the Owner - - -		Taking in Sheep or Cattle to graze - - - -	
Rates, Taxes, including Income Tax and Insurance of Farm Stock - - -		†Value of *Stock* (live and dead) and *Produce* at end of year - - - -	
Labour on the Farm - -		OTHER RECEIPTS, viz. :—	
*Tradesmen's accounts for Goods supplied, or work done upon the Farm - -		Value of Farm Produce used by Household - - -	
*Sundries - - - - -			
£		£	

* Disbursements or Expenses for the maintenance of the Occupier of the Land or of his family are not to be included.

† This is the value of *Stock* and *Produce* only—not including tillages, etc.

Signature........................
Address..........................
Date.......... ....

When the value of the stock at the beginning and end of the year cannot be shown, the Form of Declaration at the foot of the printed account should be filled up. This declaration is as follows :—

Form of Declaration to be filled up and signed, when the value of the Stock at the beginning and end of the year cannot be shown in the above Account.

I solemnly and sincerely declare that the amount of live and dead stock and produce upon my holding on* the............day of..........................190...... did not differ materially for the purpose of this account from the average amount in hand on the corresponding day of previous years [† except in the particulars stated below which are true to the best of my knowledge and belief].

* Name the day to which accounts are made up. † Strike out the words in brackets if the amount is the average one.

Particulars of difference referred to above.

Description of Stock and Produce.	Increase.	Decrease.

Signature............................

Date............190 .

When temporary abatements or remissions of rent have been allowed, a reduction or repayment of duty may be claimed in respect of the amount remitted for each complete year ending on the 5th of April. The allowance may be claimed under both Schedules (A. by the landlord, B. by the tenant) on a special form of claim which will be supplied by the Surveyor of Taxes. When the remission has the effect of bringing the total income of the tenant to an amount not exceeding £160 the whole of the duty paid or payable under Schedule B. will be repaid or allowed to the tenant.

THE LIMING OF CROPS.

A leaflet (No. 17) recently issued by the Irish Department of Agriculture deals, among other matters, with the uses of lime for agricultural purposes. The object of artificial manures is to supply plant-food; but lime, besides being a plant-food in itself, has several other important functions to perform in the soil.

It is pointed out that the application of lime sweetens

sour land, improves the physical condition of the soil, and checks the spread of certain diseases, such as finger-and-toe, among the crops. Moreover, lime acts upon certain soils in which potash or nitrate exists in such a state as to be of no service as a plant-food, and, by setting them free, indirectly supplies nutriment which would not otherwise be available for vegetation.

It should, however, be borne in mind that, unless the land contains an inexhaustible supply of material for the lime to work upon, or unless plenty of manure is applied along with the lime, it may have a detrimental effect upon the soil. If neither of these conditions exists the lime may stimulate the land for a year or two, but the ultimate effect will be to exhaust the soil.

ANALYSES UNDER THE SALE OF FOOD AND DRUGS ACTS.

The Local Government Board returns for 1900-01 [Cd. 746] show that the total number of analyses under the Sale of Food and Drugs Acts in England and Wales in 1900 was 62,858, or nearly 10,000 in excess of the number taken in 1899. This increase is attributed to the fact that under the provisions of the Act of 1899 local authorities have a duty specifically cast upon them to enforce these provisions. During 1900 many local authorities have for the first time obtained samples for analysis, and many others have largely increased the number taken.

Of the samples examined 5,503, or 8·8 per cent., were found to be adulterated, and proceedings were instituted in respect of 3,321, penalties being imposed in 2,673 cases.

More samples were taken of milk than of any other article, viz., 23,223, of which 2,497 were found adulterated. This proportion, 10·8 per cent., is rather above the average of the six previous years. London continues to show a high rate of milk adulteration, the rate being 14·2 per cent., as against 10·3 in thirty-two great towns, and 9·2 in the remainder of the country. In addition to the "adulterated" milk, many amples were stated to be "poor" or "suspicious." As

usual, most of the offences consisted in the addition of water or separated milk or in the abstraction of cream.

The percentage of butter adulteration fell last year to 7·8, as compared with 9·7 in 1899, and was the lowest rate recorded since the passing of the Act of 1875. The total samples taken amounted to 10,374.

Among other articles examined were bread (437 samples, 3 adulterated), flour (495 samples, 3 adulterated), and jam and confectionery (1,547 samples, 48 adulterated). The most adulterated articles appear to be drugs (15·4 per cent.) and spirits (12·6 per cent.) No cases of adulteration were detected in tea, wine, or lard in 1900.

ANALYSES OF IMPORTED DAIRY PRODUCE.

The Principal Chemist of the Government Laboratory, reporting on the work done during the year 1900-01, states that 1,729 samples were analysed on behalf of the Board of Agriculture. Of this number 1,672 were analyses of imported dairy produce, viz., 1,374 of butter, 211 of cheese, five of fresh milk, 71 of condensed milk, and 11 of cream. Of the imported butters examined fifteen samples were adulterated, 452 contained boric preservative, and 375 were artificially coloured.

Of the 211 samples of cheese analysed more than half came from Holland. None of them were margarine-cheese.

Three out of the 71 samples of condensed milk were found to be separated milk which had not been labelled in accordance with the Sale of Food and Drugs Act, 1899. One sample of imported fresh milk was reported against, as was also a sample of cream which had been thickened by the addition of flour paste.

COLD STORAGE OF EGGS.

The New South Wales Government have made arrangements to receive eggs for storage at their Cold Stores, Pyrmont, with a view to producers being enabled to place

them upon the market during the autumn months, when prices are higher. During the period from August, 1900, to June, 1901, 96,000 dozen eggs were so stored; this representing an increase of 3,000 dozen over the previous year, notwithstanding the fact that a number of the depositors had been disappointed with the process on account of losses sustained through not following the advice given to "store fresh eggs only."

The charges made amount to 3d. per case for receiving and delivery, and 3d. per week per case for storage. This means that eggs can be stored for eleven weeks at a cost of 1d. per dozen. The regulations require the use of special cases, each holding thirty-six dozen.

Information was sought from those depositing eggs as to their quality after keeping. Some doubt existed as to the keeping qualities of fertile eggs, but the replies received seemed to demonstrate that they can be preserved as well as infertile.

The following notes concerning cold storage of eggs were prepared by the late Secretary of the N.S.W. Department of Mines and Agriculture:—

The first requirement, and an essential one, is that the air must be kept perfectly dry; experiments in chambers where this cannot be attained have always failed. The temperature must be regulated to be as near 32 deg. Fahr. as can be managed, the extreme average range throughout the room being 31 deg. to 34 deg. Some ventilation must be provided, sufficient to carry off the moisture exuding from the eggs, otherwise deposition will take place on the walls or case, thus causing a moist atmosphere; a strong draught is unnecessary. The eggs must not be coated with any preservative which will close the pores of the shell, nor should they be washed. Washing is especially to be avoided, as it softens, the pellicle within the shell, besides providing a suitable means of conveying the mycelia of various fungoid growths to the inner portions of the egg.

It has been observed that, although the yoke does not usually change its position when kept at proper temperature, some samples which have been carried for long distances or

over rough roads show a tendency in that direction. This is especially the case when the eggs are placed small end up, the air-space at the larger end preventing the yolk floating to the top when stored with that end uppermost. Another noticeable point is that eggs from fowls fed on grain keep better and give better results than those from poultry fed on soft food and scraps. This was thought to be probably the reason why ducks' eggs did not store so well as hens' eggs, although it may be that some different conditions are required as to temperature or moisture.

Eggs for storage should preferably be infertile, but this is not necessary, as fertile eggs, if gathered daily in the morning and kept in a cool place, will keep as well; but should the germ get the slightest trace of growth, the keeping quality will be much impaired.

It is found in practice that even when the temperature of the chamber comes considerably below the range given, the great majority of the eggs will take no harm; but when some eggs were experimentally placed in the freezing room at 10 deg. Fahr., nearly one-half were found to have cracked from expansion. When, however, the temperature is not allowed to fall below 30 deg., there is practically no risk. It was noted that at 28 deg., an egg, if cracked, would freeze solid, while with the shell unbroken it would remain quite unchanged; this was tried several times and always with the same result.

[*Agricultural Gazette of New South Wales, September*, 1901.]

FOOD OF SPARROWS.

The United States Department of Agriculture have recently issued a bulletin* dealing with the relation of sparrows to agriculture. Although chiefly devoted to the various species of American sparrows, information is also given regarding the diet of the English Sparrow (*Passer domesticus*), so far as relates to its habits in the United States.

The relation of this bird to man was investigated by the

* Division of Biological Survey, Bulletin No. 15.

United States Department of Agriculture, and the results published in 1889. This investigation, which included wide field observation and the examination of more than 600 stomachs, has now been supplemented by the examination of a further 132 stomachs, and a special study has been made of the food of the young. For the latter purpose fifty birds from three days to three weeks old were collected during June and July from a farming region near Washington. The adults were collected from rural localities in various States throughout the year.

The bulletin concludes that while the native American sparrows are, on the whole, beneficial and worthy of protection, their British congener, *Passer domesticus*, is injurious to agriculture. It is stated that the examination of the adult English sparrows showed that animal matter, practically all insects, constituted 2 per cent. of their food, and vegetable matter, almost entirely seeds, 98 per cent. Insects were taken chiefly during May and June, when they composed 10 and 8 per cent. respectively of the month's food. Of the vegetable diet 7 per cent. consisted of grass seeds, and 17 per cent. of various weeds other than grasses, the remaining 74 per cent. being grain—a proportion that rose to 90 per cent. from June to August.

The examination of the stomachs of the fifty nestlings showed that, instead of being exclusively insectivorous, like the young of all the native American sparrows so far as known, the young English sparrows had taken 35 per cent. of vegetable food, 2 per cent. being weed seeds, and 33 per cent. grain. The animal food was made up entirely of insects, mostly injurious.

As an insect destroyer in America the sparrow's chief service is in the consumption of grasshoppers, principally in feeding its nestlings. As regards weeds, it is observed that the bird would be more effective in rural districts if it flew out into the fields to feed; but it appears to limit its weed seed feeding largely to the barnyard and immediate vicinity of buildings. In towns the sparrow was found to do effective work in destroying seeds of weeds in the public parks. In cities also the grain it consumes is composed very largely of

semi-digested oats in horse-droppings, etc., but in rural districts it is drawn largely from man's supply.

AGRICULTURE IN NORTH-WEST CANADA.

From the annual report of the Department of Agriculture of the North-West Territories of Canada it appears that the acreage and production of the three principal grain crops grown in the Territories in 1900 were as follows:—Wheat, 412,864 acres, 4,028,294 bushels; oats, 175,439 acres, 4,226,152 bushels; and barley, 17,044 acres, 353,216 bushels. The yield per acre of wheat is only 9·75 bushels, or half that of the two preceding years; oats and barley were also below the average. Since 1898, the first year in which a report was issued, the area under wheat has increased by 100,000 acres, and that devoted to oats by 70,000 acres.

No statistics are available as to the numbers of live stock, but considerable attention is given to the fattening of cattle in the ranching districts. An interesting feature of the cattle industry has been the movement of stock from Ontario, Manitoba, and the arable districts of the Territories, to Southern Alberta and Western Assiniboia. The total influx of cattle into the ranching districts in 1900 was over 42,000 head, of which 36,000 were stores from Ontario and Manitoba. During the past few years the Department of Agriculture has afforded encouragement to the importation of pure bred bulls, but the necessity for this action is said to be now disappearing, as there is hardly a town or village of any importance in which pure bred bulls are not offered for sale by local importers.

Sheep farming is for various reasons declining, notwithstanding the existence of a favourable home market for wool, and an unlimited export market for mutton. The flocks in the Territories are estimated to number 225,000 head, but there are said to be large tracts of land in Western Assiniboia and Southern Alberta admirably adapted to sheep raising on a large scale, which have never been utilised.

Pig-keeping is reported to be gradually reaching the point where the local demand for fresh pork can be supplied by the home breeders.

Efforts are being made to build up the dairy industry. The number of Government creameries in operation in 1900 was 19, and the output of butter from these establishments amounted to 637,052 lbs.

AGRICULTURE IN SOUTH AFRICA.

The last enumeration of live stock in Cape Colony relates to the year ending 31st May, 1899, and later statistics are not available on account of the war. The following results are recorded in the "Statistical Register of the Cape of Good Hope for the year 1900": Horses numbered 388,000, mules, 48,000, and asses, 42,000. There were 1,077,000 cattle (of which upwards of 667,000 were cows or heifers), 5,573,000 goats, 12,640,000 sheep, and 246,000 pigs. The production of butter was 2,879,000 lbs. The Angora goats yielded 6,707,000 lbs. of mohair, and the sheep 35,180,000 lbs. of wool. Ostrich feathers weighing 278,000 lbs. were obtained from 262,000 birds.

According to a recent statement made by the Under Secretary for Agriculture, "the portion of the Cape Colony which lies to the north of the Orange River is the best adapted for cattle rearing. The dairy industry has been greatly checked by rinderpest, but the number of co-operative creameries is rapidly increasing. It is believed that there is a great future for the South African horse, which, compared with the English horse, can live on much less food, and does not suffer from the climate; he is sounder and more sensible, and does not tumble into holes. He is also taught more easily to stand alone without being tied up."

The sheep industry has to contend against two serious evils, viz.: scab and the blood sucking tick. In the districts of King William's Town, Bedford, and Somerset East there are from 5,000 to 10,000 sheep on the holdings, or from 30 to 120 sheep per square mile. The "grass" districts, further to the east and north, carry from 150 to 350 sheep per square

mile. Angora goat farming is a prosperous industry, and the production of mohair has largely increased. The total production was in 1899 greater than that of any other country in the world, exceeding even Turkey by over 25 per cent. in the lower grades of hair. The quality and quantity are, however, inferior to the finest Turkish mohair. Ostrich farming at the Cape was at first a very speculative industry, but during the last fifteen years it has become fairly stable and highly successful.

The following yield of the crops during the year ending 31st May, 1899, are the most recent figures available :—

Crop.	Muids.	Bushels.
Wheat	740,000	2,220,000
Barley	277,000	831,000
Oats	604,000	1,812,000
Rye	101,000	303,000
Mealies	953,000	2,759,000
Kaffir Corn	669,000	2,007,000

The potato crop yielded 400,000 muids, or 1,200,000 bushels.

Nearly 42,000,000 bundles of oat-hay were harvested. The cultivation of lucerne gives satisfactory results throughout a large area in the Colony, where the rainfall is from twenty to forty inches ; from four to six crops being obtained in summer and two in winter.

Fruit culture is regarded as in its infancy at the Cape. The colony produces wine, which finds a ready sale. The value of wine and brandy produced in 1899 was estimated at £34,900 and £7,670 respectively.

THE AGRICULTURAL TRADE OF INDIA.

The official review of the trade of British India with foreign countries for the year ending 31st March, 1901 (Cd. 827), which has been recently published, contains much information relating to the agricultural exports and imports of India.

The Report states that trade generally was depressed during the first six months of the year, and that its revival

after September, 1900, was not sufficient to efface the traces of famine which were very apparent during the earlier part of the year. The continued presence of the plague in epidemic form also affected trade to a considerable extent.

The agricultural conditions of the country materially reduced the export of food grains. The trade in wheat practically ceased, and only 50,000 cwts. were exported. This figure stands in striking contrast with those of previous years. In 1895-6, for instance, the export amounted to ten million cwts., though in each of the next two seasons the quantity was only about two million cwts.; in 1898-9 the exports again increased to 19½ million cwt., and then fell to less than 9¾ millions in 1899-1900. The quantity of the other food grains (mainly millet and pulse) exported from India in 1900-1901 was also exceedingly small, but the trade in these grains is comparatively of little importance.

It is interesting to note that only a trifling fraction of the grain required for the famine-stricken tracts was drawn from places outside India. The imports of grain and pulse last year did not reach 1,960,000 cwts., and yet this quantity was greater than in the preceding year by over 440,000 cwts. Even in the famine years of 1896-7 and 1897-8 the corresponding imports averaged only 1,080,000 cwts., and the normal import trade is only 60,000 cwts.

The most important seeds which form the bulk of the Indian oilseed trade—viz., linseed, rapeseed, and sesamum seed—are subject to the same climatic influence as wheat because they are cultivated in the same regions and under similar conditions. The quantity exported in 1900-1 amounted to barely 11,000,000 cwts., the lowest figure reached since 1882, when the crops also failed. But although the export was small last year, the prices for linseed and rapeseed ruled high, and the aggregate value of the trade was greater than in several seasons when the quantity exported has been much larger.

One result of the failure of the monsoon was indirectly indicated by the unprecedented export of hides, which amounted to 14,650,000 during the year. An almost equal number of skins of smaller animals other than horned cattle

was also exported. There was, fortunately, a good market for these abnormal supplies, and prices were well maintained. Further "salvage from the famine wreckage" was represented by the export of 112,000 tons of bones. An almost equal quantity had left the country during the previous twelve months, the average of former years being 78,000 tons.

The Report states that "the 120 lakhs of rupees received for bones during the two years 1899-1900 are a miserable set-off against the loss which the augmented exports represent above the ordinary cattle mortality of an average year. The export of oil-cake and rice-bran also increased, but this trade is to be regarded with the satisfaction with which economists view the utilisation of articles previously treated as waste matter."

It is estimated that, owing to the effects of the drought and famine, the decline in the value of grain, pulse, and oilseeds exported in 1900-1 amounted to 500 lakhs of rupees.

Owing to the difficulties of obtaining suitable horses for the army, high prices were offered to importers from Australia, whence 8,340 were received during the year.

The Review also contains information regarding the export trade in several other articles, such as cotton, tea, coffee, and sugar.

Exportation of Eggs from Austria.

The exportation of eggs from Austria-Hungary has developed considerably of late years. In 1898 the quantity amounted to 1,885,200 cwts., in 1899 to 2,047,000 cwts., and in 1900 to 2,141,000 cwts. The excess of exports over imports was 1,088,000, 1,214,000, and 1,366,000 cwts. in 1898, 1899, and 1900 respectively.

Galicia is most intimately connected with this trade, both in Galician and Russian eggs. The export to North Germany, whither the greater part of them go, alone amounts to 530,000 or 550,000 cwts. Foreign competition, especially from Russia, Hungary, and Italy, seriously affects the Gali-

cian trade. The imports from Russia into Galicia reached in 1898 some 850,100 cwts., only two-thirds of this going beyond Podwoloczyska.

At this latter town there are three albumen factories, each of which annually consumes three to three and a half million eggs, 1lb. of albumen being extracted from 7lbs. of whites of eggs. The albumen is used for printing textiles, in the manufacture of porcelain, in sugar refineries, and clarification of wine. It is sent out in cases of about one and two cwts. at £5 5s. to £5 10s. per cwt., and goes to the other Austrian territories, Germany, France, England, and America. The egg yolk is also worked up at the same time. The annual production of a factory amounts to 500-600 casks of about 4 cwts. each, worth some £2 per cwt. The egg yolk is used for dressing glove leather.

[*Deutsche Landwirtschaftliche Presse.*]

CO-OPERATIVE DAIRY-FARMING IN DENMARK.

The Appendix to the Minutes of Evidence of the Departmental Committee on Food Preservatives contains an interesting report of a visit paid to Denmark by Dr. Timbrell Bulstrode and Mr. Huddart in connection with the business of the Committee. In this report it is observed that Denmark is a country of co-operative dairy societies. The country has laid itself out to perfect its butter manufacture as a national industry, and local exhibitions held all over the State in furtherance of the butter trade are aided by the Government. No State aid is, however, afforded to small farmers in need of capital for outlay on their business, but money can be borrowed at a low rate of interest from local banks, some of which belong to large co-operative societies. The central creameries draw milk from an average radius of six miles, and the farmers (who are members of the society to whose creamery they send their produce) are paid according to the amount and the quality of the milk sent in. Government inspectors are employed to take samples of separated

milk on its way from the creamery to the farm for cattle food, in order to ascertain that the law, which requires that all milk used as food for cattle shall be duly pasteurised, has been carried out.

The milch cattle are mostly of the red Danish breed, but in Jutland the local breed is well represented. They are tethered in the fields by chains of some 12 ft. long, with a 3 foot iron staple to fasten in the ground by means of a mallet. They seldom drag their tethers, save under circumstances of great fear, *e.g.*, at times of heavy thunderstorm or after very excessive rain. The cows are moved seven times a day gradually from one side of the field to another.

Among the establishments visited by the writers of the report was a farm at Sofiendal and a co-operative dairy at Haslev, both being some thirty miles south-west of Copenhagen. Sofiendal is described as a large farm of some 300 cows, and with a milk business of £2,812 to £3,375 yearly, entailing an annual outlay on about 400,000 lbs. of maize for cattle. Milking is performed at 4 a.m. and 4 p.m. The tails of the cows are cut in winter for purposes of cleanliness, and the coats of the cows brushed twice a day. Although it is not considered desirable to wash the cows' udders, each of the milkers has her own clean cloth wherewith to rub the udders in winter, and is provided once weekly with a clean blue apron to wear over her dress. Each milker washes her hands before beginning to milk, and rinses them between the milking of each cow. She milks from eighteen to twenty cows, the milk being at once removed from the stable, emptied into a large can, and screened.

At the time of the visit of Dr. Bulstrode and Mr. Huddart the cows were being milked in the fields, when there was no cleaning of the udders (which is not regarded as requisite in the open in the summer), but the women frequently rinsed their hands, and the milk of each cow was at once passed through a fine metal gauze screen, which was covered with a white cloth, into a churn standing in a cart. The milk was also strained at the farm before passing over an 18-coil cooler, and it was then placed in an ice-water tank till despatched. The milk is weighed before being sent off, and the cans are sealed.

One of the cow-houses at Sofiendal served for 112 cows, the heads of the cattle in each double row being four feet apart. The house is forty-five feet wide, and each of its eight sections is fifteen feet long and twelve feet high, sufficing for fourteen cows, and giving each of them 580 cubic feet of air space. There are seven doors in the stable, and fifteen windows, all opening in part. The stable is quite in the open. Floor, ceiling, and walls are whitewashed twice yearly. Every two cows have one water trough, which automatically fills, but never overflows. This is regarded as a safeguard against tuberculosis, such as would not be procured by a water supply common to the whole herd. The water is from a pump well in the yard. The house is maintained as far as practicable at 13 deg. C. (55 deg. F.). The excretions, which are removed twice daily, fall into square-cut stone trenches in the rear of each row of cattle, which trenches form effective channels for the disposal of liquid filth. The cows are in the stables from October 1st to April 30th, never being out of doors during that time. Thirty pounds' weight of roots is given to each cow daily. Milk can be sent from cows fed as the farmer chooses, so long as the butter derives no unpleasant taste therefrom.

The Haslev co-operative dairy was visited as being typical of an industry which is in operation to-day in different parts of rural Denmark. It is a self-contained creamery on the co-operative system, and complete down to its telephone and its own electric plant. The water supply is from a well sunk 62 ft. into the chalk. No ice is used, cooling being effected by cold water only. The engine is of six horse-power, and the boiler of fourteen horse-power.

The milk from 1,200 cows is dealt with daily. All the milk on receipt passes through a strainer fixed over the weighing machine, and also through a centrifugal separator, each separator dealing with 3,600 lbs. of milk per hour. The milk is then warmed to 40 deg. C. (104 deg. F.), the cream and the skimmed milk running by separate channels to different pasteurising plant, each being pasteurised at 90 deg. C. (194 deg. F.), the cream thereafter being cooled down to 10–12 deg. C. (50–54 deg. F.) by means of a cold

water coil-cooler. The pasteurised skimmed milk is returned to the farmers, each of whom has his own cans. The cream is again heated to 40 deg. C. (104 deg. F.), and the butter starter, procured from the Copenhagen Laboratory, is introduced. The cream then stands till next morning, when it is churned for half an hour, the colouring matter, 5 lbs. per cent. of butter, being added in the churn. Each churn makes 180-200 lbs. of butter in half an hour. When the butter-milk has been expressed on the worker, salt is added in the proportion of 7 per cent. for Northern England and 2 per cent. for London. Salt is thought to lose three-sevenths of its weight in the working, at least forty revolutions of the table being made. The butter is placed in cold water after being worked, and is again put on the table before being packed in casks, the retention of not more than 11 per cent. of water in the finished article being aimed at, and not more than 16 per cent. permitted.

PASTEURISATION OF CREAM FOR BUTTER-MAKING.

In a report on a visit paid to Denmark in relation to the use of chemical preservatives in milk and butter, Dr. Bulstrode and Mr. Huddart state that year by year the manufacture of butter from pasteurised cream, prepared for the churn by the use of pure cultures, has been practised in an ever-increasing degree in Denmark. In connection with the subject of pasteurisation, it is pointed out that cleanliness is regarded as a very necessary precedent to the process. If once the bacterial products have conferred upon the milk or cream any unsatisfactory flavour Danish experts hold that no process of pasteurisation can remove such flavour.

By such pasteurisation the Danes have aimed at destroying what may be termed *the unknown* in the bacterial flora of cream, in order that, by the use of "pure cultures" of bacteria, they may be able to substitute *the known*. Their position is that without such precautions the production of a butter having a characteristic aroma is more or less a matter of chance, and hence cannot be absolutely relied upon. The

essence of the usual method of butter-making is to endeavour to bring about conditions which are favourable to the development of certain species of bacteria; the essence of the Danish method is to kill or inhibit the growth of all the bacteria concerned in the process of "ripening" and to promote the necessary souring of such cream by the introduction of a starter prepared from "pure cultures." By this means butter is manufactured which can be safely exported to England without the use of preservatives. It is of interest, in relation to the bacterial flora of cream, to note that there would appear to be a tendency to pasteurise at an increasingly high temperature, and experience indicates that, within certain limits, the higher the temperature at which the cream is pasteurised the better is the resulting butter likely to be.

The writers of the Report state that the progress of the practice of pasteurisation in Denmark has been remarkable, and at the present time the vast bulk of Danish butter is made from cream thus treated. The passing of the law of March 26th, 1898, which renders the pasteurisation of milk used for the food of cattle compulsory, has doubtless been a force in the diffusion of the custom of cream pasteurisation, but the practice seems to have become general mainly owing to the satisfactory results which, in the opinion and experience of the Danes, have accrued therefrom. Moreover, the fact that the process is calculated to destroy most, if not all, the pathogenic bacteria has not been without its influence in a country where the care of the public health is made a matter of considerable concern.

[*Report of the Committee on Food Preservatives. App. III., Cd.* 833.]

LIVE STOCK IN URUGUAY.

The Board have received through the Foreign Office a memorandum, prepared by Mr. C. S. Pratt, Acting Consul at Montevideo, upon the census of live stock taken in 1900 in Uruguay.

The total number of animals is given as 26,134,896, or

5,355,787 more than in 1898. This increase of 25 per cent. is attributed chiefly to a growing familiarity of the population with the collection of similar returns, although the people still frequently regard such inquiries with suspicion. The number of each kind of stock in 1900 is given as follows :—

Cattle	6,827,428
Horses	561,408
Mules	22,992
Sheep	18,608,717
Swine	93,923
Goats	20,428

An interesting table is given concerning the nationalities of the different owners of stock. Of foreigners, Brazilians own the largest number of cattle (1,968,000), while Spaniards come next with over 823,000 head, and they are followed by English with 276,000 and French with 240,000. The Uruguayans themselves hold 3,135,000 head of cattle. Uruguayans hold 10,783,000 head of sheep; Spaniards, 2,769,000; Brazilians, 2,371,000; French, 1,142,000; English, 515,000; and Italians, 479,000. The relatively large proportion of cattle held by Brazilians is explained by the fact that the northern districts bordering on Brazil are better suited for raising cattle than sheep.

No details are given of the pecuniary value of the herds belonging to owners of different nationalities, and in estimating their relative importance it must be remembered that the herds vary greatly in value. The cattle belonging to British subjects, for instance, although not relatively numerous, are generally well bred and carefully selected beasts, while the herds of Brazilians contain a large proportion of small animals of the old native breed, which, though hardy, have no great market value.

Italians, although very numerous in Uruguay, do not figure largely as stock owners, because the Italian immigrants belong almost entirely to the poorer classes, possess very small holdings (when they do not prefer to remain in the towns), and are content, owing to their great frugality, with very small profits.

German subjects are set down as owning 40,000 cattle

and 122,000 sheep, but this estimate is thought to be under the mark.

The numbers of stock owners of the principal foreign nationalities are given as follows: — Spaniards, 3,065; Brazilians, 2,472; Italians, 1,499; French, 637; Argentines, 216; and English, 106. Uruguayans themselves number 14,442, out of a total of 22,674 stock owners. It is probable that persons of foreign parentage born in the country are included amongst Uruguayans. British proprietors are most numerous in the Departments of Colonia, Soriano, Paysandu, and Rio Negro, where the best land is found.

CONDITION OF THE RUSSIAN PEASANTRY.

During the forty years which have elapsed since the emancipation of the Russian peasantry from serfdom, the Government have done much to ameliorate the condition of the agricultural classes, yet the condition of the peasantry throughout the Empire still causes serious apprehension.

Since 1861, the year of the emancipation, the Government have expended on nearly 90,000 village communes the sum of £95,000,000 for the redemption of land from proprietors, and 90,000,000 acres were thus acquired by these communes. The arrears of the redemption tax have from time to time been remitted, but they have nevertheless continued to grow during the last decade until at the present time they amount to no less than £11,000,000. In addition to the relief given in respect of this tax, the Government have either entirely abolished or partially remitted a number of other burdens; but the benefits thus conferred on the peasantry have to a great extent been neutralised by the imposition of increased indirect exactions, which bear heavily upon the rural population. Other causes of the growing impoverishment of the peasantry of European Russia are, as some think, the communal system of land tenure; the insufficient area of the allotments; and the unenlightened condition of the agricultural classes of Russia proper, which prevents them from utilising their land in a manner more profitable and less exhaustive than that at present adopted.

[*Foreign Office Report Annual Series*, 2,708.]

AGRICULTURE IN THE CONSULAR DISTRICT OF DAMASCUS.

The Board have received through the Foreign Office a report drawn up by Mr. W. S. Richards, H.M. Consul at Damascus, on the agricultural condition of the southern part of that vilayet.

Information concerning the agriculture of this district is of interest in view of railway expansion in the country; and the statistics given in the report have been compiled from private sources, which Mr. Richards considers reliable, no official figures being available. It should be noted, however, that the details supplied are not exhaustive, but are confined to such districts only as are likely to be affected by the railways.

The following table shows approximately the population, area, and grain production of the districts dealt with by the Consul in his report. He states that the total production of wheat in Ajlun Caza, as shown in the table, is probably over-estimated, but that the other figures given may be accepted as being approximately correct.

District.	Population.	Total Area.	Cultivated Area.	Total estimated Annual Production.			
				Wheat.	Barley.	Other Grain.	Total Grain.
	No.	Acres.	Acres.	Bushels.	Bushels.	Bushels.	Bushels.
Hauran - - -	53,540	751,875	297,175	1,064,000	448,000	1,165,000	2,677,000
Jebel Druse - -	33,090	529,000	245,140	791,000	417,000	770,000	1,978,000
Ajlun Caza - -	30,000	531,250	225,000	1,680,000	420,000	1,050,000	3,150,000
Southern Part of the Central Caza of Damascus	—	—	—	155,000	147,000	145,000	447,000
Total - -	—	—	—	3,690,000	1,432,000	3,130,000	8,252,000

The areas comprised in the first three districts include 350 villages altogether, but data have been collected concerning ten villages only in the fourth named district.

The lands enumerated in this table are said to be the richest in Syria. In the Hauran, the most fertile of all, the geological formation consists of basalt, trap, and other

volcanic rocks, which are well known to be rich in plant food. An acre of land in this locality only requires half a bushel of wheat seed to produce 20 to 24 bushels of grain. This degree of fertility is all the more remarkable when it is remembered that, the country being destitute of trees, all dung is required for fuel, and none is available for agricultural purposes. On the other hand, it is to be observed that, in consequence of the great extent of arable land, the same soil is only sown once in every four years.

Barley ranks next in importance among the cereals in the Hauran district, and yields from 16 to 32 bushels per acre. The other corn crops are a small variety of maize known locally as "rezzineh," two species of vetch, and a small quantity of chick peas.

The Jebel Druse district is almost as fertile as the Hauran, the agricultural products in the two districts being very similar. The "Jebel," however, has one advantage over its neighbour, more especially in an exceptionally dry summer like that of 1901, in that the land, owing to the heavy fall of dew at night, can to a large extent dispense with other moisture.

The Ajlun Caza, again, is a very rich district, and is much better watered than either of the two above mentioned. It also produces a greater variety of crops, although its soil is not really so rich as either the Hauran or the "Jebel." The district is the most thickly-wooded part of Syria, and all the best charcoal produced in the vilayet comes from this part.

The ten villages of the southern part of the Central Caza of Damascus, the remainder being left out of consideration as being too remote from the railway, not only produce a large quantity of corn, but also devote a great amount of attention to fruit-growing. The total annual fruit crop of this district is put at 3,410 tons, the greater portion of this consisting of grapes.

AGRICULTURAL SCHOOLS IN WÜRTEMBERG.

The Foreign Office has recently published a report by Dr. Frederick Rose, His Majesty's Consul at Stuttgart, on

the technical, agricultural, industrial, commercial, and art schools of Würtemberg. The section of the report relating to agricultural education describes the following types of schools which exist in the kingdom:—(1) agricultural, (2) farming, (3) winter schools, (4) improvement schools, (5) rural house-keeping schools for women, and (6) a wine-making school.

The most important institution in the first category is the Hohenheim College, which is the oldest agricultural high school in Germany. It was founded in 1818 as an agricultural academy, and raised to the rank of a high school in 1865, under direct official supervision. The principal building, which was formerly a ducal hunting castle, lies on a plateau about seven miles distant from Stüttgart. It is managed by a director and a council, which includes the principal professors of the academy and other officials. Dr. Rose states that the question is still debated in Germany whether a purely agricultural high school affords more advantages than an agricultural faculty at a full university supplying general education. However it may be, the Hohenheim Academy occupies the highest rank among agricultural schools in Germany, in spite of the many new ones which have been founded during the last century. The close vicinity of Stuttgart, moreover, offers unlimited opportunities for general education, and it also has the additional advantage of being situated in a strongly agricultural district.

The objects of the institution are described as follows:—(1) The instruction of future owners, tenants, or managers of large estates in all branches of theoretical and practical agricultural science; (2) the theoretical and practical instruction of future professors, lecturers, and teachers of agricultural subjects; (3) the training of future State officials of the administrative departments; and (4) scientific research for the furtherance of agricultural knowledge. An agricultural estate of 800 acres and experimental fields are attached to the college, which also possesses laboratories, etc., for various technological purposes. The full course of instruction lasts six terms, or three years. The following fees include instruction, lodging and service, viz., £9 10s. per term for the first

and second terms, and £7 10s. per term to the end of the course, for natives of Wurtemberg. Subjects of other German States and foreigners pay £14 per term for the first and second terms, and £12 10s. per term afterwards. The majority of the students live in the academy, and the average price for meals is about two shillings a day. The number of students in 1899 was 109, of whom 21, or about 20 per cent., were foreigners.

There is also a Veterinary High School at Stüttgart, where about 100 students are in residence. The instruction given is of a high order and the examination for the diploma is severe.

The three Farm Schools which exist in Würtemberg are intended for the instruction of small peasants, farmers, and tenants in practical agricultural work. Their organisation is quite different from that of other agricultural training institutes. Each school is managed by a director, who must be a farmer. He rents the estate attached to the school and cultivates it at his own risk. He gives instruction in agriculture and subsidiary subjects, and is assisted by an instructor, a farming inspector, and a veterinary surgeon.

The course of instruction lasts three years, and the number of pupil-labourers is generally limited to twelve. The director is not entitled to any compensation from the State if there are less than twelve, nor is he allowed to exceed this number without special permission. Particular attention is paid to practical instruction, which includes almost every branch of farm-work. The pupil-labourers do not pay any fees, and receive board and lodging free of cost. The working hours are fixed at ten in summer and eight in winter; theoretical instruction is suspended during harvest, when two hours more per day are required. The areas of the three schools are respectively 292, 310, and 480 acres.

The Würtemberg agricultural winter schools are open from November to March. They are intended for peasants' sons who have left school and wish to become farm labourers or small farmers. The various courses are carefully framed with a view to consolidate and extend the education acquired at school, and to give instruction in agricultural work so as

to enable the pupils to manage small peasant farms. Two courses are held annually, but the first course provides complete agricultural elementary instruction. The fees amount to about twenty-five shillings per course. The number of pupils attending these schools in 1898 was 226.

There are now only two agricultural improvement schools in the kingdom. There are six female rural house-keeping schools, which were founded for the purpose of instructing peasants, and workmen's daughters in simple domestic economy, cleanliness, order, hygiene, and nursing.

The wine-making school is intended to instruct young peasants to cultivate their vineyards in a rational manner.

Courses of lectures are also given in Würtemberg by travelling lecturers and experts.

[*Foreign Office Report, Miscellaneous Series, No.* 566. *Price* 2½*d.*]

AGRICULTURAL EXPORTS OF MOROCCO.

According to a Report issued by the Foreign Office (Annual Series, No. 2,723), the principal item in the exports from the port of Tangier in 1900 was eggs, of which upwards of 46,500,000, valued at £78,181, were shipped. The trade has sprung up within the last few years, and has rapidly increased. The eggs, though small, are of good quality, and large quantities are procurable at a moderate price. Oxen rank next in importance to eggs, the value of the exports from this port having amounted to £75,709; 14,418 head were shipped to Gibraltar and Malta, and over 9,000 to Spain and Melilla. As a result of the recent Moorish mission to England, permission has been granted by the Sultan for the exportation of potatoes, tomatoes, bananas, and the various kinds of pumpkins, marrows, etc. As some districts in the country are very suitable for the production of these articles, it is thought probable that a considerable trade will spring up.

The Board have been informed by the Foreign Office that the Moorish Government have also permitted the export of green peas and onions from all Moorish ports, subject to an *ad valorem* duty of five per cent.

WARSAW HOP FAIR.

The Board have received through the Foreign Office a copy of a report, drawn up by Captain A. Murray, H.M. Consul-General at Warsaw, upon the annual hop fair in that city.

Captain Murray states that the fair, contrary to expectation, turned out badly for local hop growers. Shortly before the fair prices were good, some early hops of best quality changing hands at 102s. to 108s. per cwt. Reports as to the world's production of hops indicated that the German crop was much below the average, but that Hungary, England, and America had large yields; and that, although the world's total supply was thus abundant, the amount of first quality hops was expected to prove limited. The bulk of the Polish crop, however, was late, and did not come up to promise, being more or less spoilt by the weather.

The quantity of hops exposed was nearly 4,000 cwts., as compared with under 3,000 cwts. in 1900; but the fair is of importance more on account of the fixation of prices than of the amount of sales. But on this occasion practically no business was done and no prices could be established. A great proportion of the hops brought to the fair had already changed hands, but a considerable quantity were not ready and were brought before being properly dried, which led to several cases of heating. These parcels were naturally sold for what they were worth, at prices varying between 34s. and 68s. per cwt. This constituted all the business done, hardly any hops in good condition changing hands.

Various factors also contributed to a depression in the brewing trade, which further reacted upon the sales.

TESTING THE AGE OF EGGS.

The *Deutsche Landwirtschaftliche Presse* of the 28th September last publishes an account of a method of determining the age of eggs, which has been tested and awarded a medal by the Society of Saxon Poultry Breeders at Halle, and has also received prizes elsewhere.

The apparatus is based on the physiological property that the air-bubble at the blunt end of the egg increases in size with the growth of the embryo. When the egg is placed in liquid it has consequently an increasing tendency to become vertical, with the blunt end uppermost. The apparatus itself consists of a glass vessel, bearing at the back lines drawn at various angles, each line being marked with the age. The vessel is filled with some harmless liquid, in which the eggs to be tested are laid. Each egg will take up a certain position, and. according to its age, its longer axis will be more or less inclined to the horizon. The direction of this axis is compared with the lines at the back of the vessel, and the age of the egg read off at the line to which its axis is parallel.

A new-laid egg lies horizontally at the bottom of the vessel. An egg three to five days old raises itself from the horizontal so that its axis makes an angle of about 20 deg. At eight days old this angle has increased to about 45 deg. at fourteen days it is 60 deg., at about three weeks it is 75 deg., and after four weeks it stands upright on the pointed end. A bad egg, or one more than five weeks old, floats. With practice it is stated that the age can be told to a day.

Colouring Matter for Dairy Produce.

The most commonly used colouring matter for dairy produce is annatto, a vegetable extract from *Bixa orellana*. This, and certain other yellow colouring matters of vegetable origin (turmeric, saffron, etc.), have generally been considered harmless in the quantities employed, but they are gradually being superseded by coal-tar yellows, the action of which upon the human system is not fully known. Butter from Holland, Australia, and the United States is very frequently coloured with coal-tar yellows. A large number of margarines are also so coloured. The coal-tar yellow most frequently employed for dairy produce and margarine is known commercially as "butter yellow," its chemical title being "Dimethyl-amido-azo-

benzene." Tropoeolins, which are sulphonated-azo-derivatives from coal-tar, are also coming into use. "Butter-yellow" is generally supplied by the trade ready dissolved in oil, either cotton-seed, rape, linseed, or sesame oil.

[*Report of the Committee on Food Preservatives.* *Cd.* 883. *Price* 4*s.* 3*d.*]

Butter Trade of New South Wales.

The butter-making industry of New South Wales has greatly expanded during recent years. According to Part IX. of the "Statistical Register" of the Colony for the year ended 31st March, 1901, the annual production of butter increased from 21,000,000 lbs. in the year 1892-3 to 41,000,000 lbs. in 1900-1. This increased production has been accompanied by an important expansion in the quantity of the exports of this commodity from the Colony. Particulars as to these exports for each year during the last decade are shown in the following table:—

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	lbs.	£		lbs.	£
1891	533,869	22,622	1896	2,565,806	102,502
1892	1,713,466	73,205	1897	6,526,673	258,725
1893	3,161,792	124,936	1898	8,949,588	376,421
1894	4,590,606	150,263	1899	7,801,063	340,372
1895	2,028,349	57,575	1900	10,410,434	436,786

Since 1891 both volume and value of the butter exports of the Colony have increased nearly twenty-fold; and the quantity exported in 1900 exceeded that returned for any previous year by nearly 1,500,000 lbs.

United States Potato Crop.

The Board have received through the Foreign Office a report, drawn up by Mr. W. Wyndham, H.M. Consul at Chicago, upon the potato crop in the United States. Mr. Wyndham, writing on the 5th of September last, states that a

great deal has been printed in the Chicago newspapers as to high prices ruling for potatoes in the Western States. As these reports might get into English papers, the Consul points out that the price of summer potatoes has been about four to five shillings per bushel, or from £7 10s. to £9 6s. 8d. per ton; and winter potatoes are expected to bring about £4 13s. 4d. to £7 3s. 4d. per ton, unless early frosts should damage the crop in Minnesota, Wisconsin, Michigan, and New York, in which States the yield is expected to be large. The customs duty on potatoes imported into the United States is £2 6s 8d. per ton; freight from seaboard, £1 7s. 6d. per ton; commission on sales, 7 per cent., with small charge for haulage, etc. Under these circumstances, Mr. Wyndham thinks that English shippers would run great risks in shipping potatoes to the United States without careful inquiry into the state of the market.

Russian Flax Trade.

The weather experienced in Russia during the year 1900 was not favourable to the growth of flax. In the earlier part of the season the crop promised well, but owing to subsequent drought the harvest proved disappointing. Growers did not, however, realise at first the extent of the failure, and large quantities of the flax had already been sold abroad; but as soon as the producers became aware of the limited supply, a rapid rise occurred in the prices of the better qualities of flax, and even the inferior grades commanded a high figure. The total exports of flax from Russia in 1900 amounted to 170,000 tons, as compared with 225,000 tons returned for 1899. The United Kingdom is the largest buyer of Russian flax, her imports in the two years above mentioned being 44,000 tons and 64,000 tons respectively. The aggregate value of Russian exports of flax in 1900 was £4,657,000, the purchases of the United Kingdom being valued at £1,153,000. After the United Kingdom, the largest demand for Russian flax comes from the north of France, a small quantity also being exported to Belgium.

[*Foreign Office Reports, Annual Series,* 2698 *and* 2708.]

Export of Pork from Servia.

The Board have received through the Foreign Office a memorandum by Sir G. F. Bonham, Bart., H.M. Minister at Belgrade, upon the exportation of pork from Servia. Sir G. Bonham reports that the enterprise initiated by the Slaughterhouse Company for the export of salt pork, bacon, and lard to France and England has met with success, and that the trade has recently been extended to Algeria, some ten tons having been dispatched to Oran. It is stated that large quantities of preserved meat and bacon are required for the French colonies, and the latter are expected to prove a good market for ervian produce. It is, however, considered desirable to increase the number of swine in Servia, particularly those of the Yorkshire and Berkshire breeds.

Sugar Beet in Russia.

According to a report received through the Foreign Office from H.M. Consul-General at Odessa, the area under sugar-beet in Russia in the year 1900-1901 was 1,322,000 acres, this representing an increase of 111,000 acres as compared with the previous year. On the other hand, the total production shows a falling off, this year's crop amounting only to 6,340,000 tons, as against a total yield of 7,211,000 tons returned for the previous season. This decrease may, perhaps, be partly attributed to damage from insects. It is stated that 272 factories are engaged in the manufacture of beet sugar in the country, four additional factories having been started during the past year. Their total output for the year 1900-1901 is estimated at 786,175 tons, as compared with the 785,516 tons in the previous season. The greater portion of the sugar produced is retained for home consumption, but a considerable amount is exported, Persia, China, Finland, and Western Europe being Russia's best customers.

[*Foreign Office Report, Annual Series*, 2709.]

Russian Timber Trade.

The spring of 1900 opened with abnormally high prices for sawn timber in Russia; but owing to the great rise in freights which subsequently occurred, the foreign demand slackened, and prices ruled low in the latter part of the year The total quantity of timber exported from the port of Riga in 1900 was 46,550,000 cubic feet, as against 46,700,000 cubic feet in 1899, thus showing a decrease of 150,000 cubic feet. The exports of deals and lathwood from St. Petersburg and Cronstadt also showed a falling off; but rickers and props were more actively exported from this district, especially to the British Islands. The United Kingdom is the largest purchaser of Russian timber, her imports constituting, in 1900, 40 per cent. of the entire Russian exports. The value of Russian timber exported to the United Kingdom in 1900 is estimated at £2,532,000, as compared with £2,249,000 in 1899.

[*Foreign Office Reports, Annual Series, Nos.* 2698 *and* 2708.]

Poultry Exhibition at Madrid.

The Board have received information through the Foreign Office that an international exhibition of aviculture, pigeon breeding, and other rural industries will be held from the 1st to 31st May next at Madrid. Temporary shows for the more perishable kinds of produce (dead poultry, etc.) will be held in connection with the exhibition. Forms of entry and all particulars may be obtained from M. le Commissaire général de l'Exposition d'Aviculture, rue de la Diputacion, 373, Barcelona, Spain.

Agricultural Rates Act.

The payments to the several spending authorities of the annual grant in respect of the deficiencies arising from the provisions of the Agricultural Rates Act, 1896, amounted for the year 1900-01 to £1,329,557. Of this sum there were paid to Boards of Guardians, £506,867; to Rural District Councils, £356,449; to County Councils, £331,439; to School Boards, £107,259; to Town Councils, £18,452; to other Urban District Councils, £4,701: and to the Receiver for the Metropolitan Police District, £4,390.

REPORTS ON FOREIGN CROPS.

Crops in the United States.

In the October and November numbers of the *Crop Reporter*, the United States Department of Agriculture have published preliminary estimates of the average yields per acre for the past season of some of the principal crops in that country. Statistics as to the acreage under each of these crops were given in earlier issues of the publication referred to; so that, by utilising these figures in conjunction with the produce estimates now available, the approximate total production in each case may be calculated.

The average production of maize per acre is estimated at 16·4 bushels, this being the lowest yield ever recorded for the crop. On an area of about 82,920,000 acres returned for this year this yield would indicate an aggregate production of about 1,360,000,000 bushels, or 745,000,000 bushels less than last year's total.

The area under oats this year was approximately 26,325,000 acres, and the crop is reported to have yielded an average of 25·1 bushels per acre, or 2·1 bushels below the mean of the previous ten years. From these data, it may be calculated that this year's harvest of oats amounted to about 660,000,000 bushels, as against the 810,000,000 bushels returned for last year.

The average yield of barley is estimated at 24·7 bushels, or 1·3 bushels above the normal. The acreage of this crop amounted to 2,860,000 acres, so that the total production would be about 71,000,000 bushels, thus showing an increase of 12,000,000 bushels on last year's crop.

The rye crop is also reported to be somewhat above the average this season, the estimated average yield per acre

being 15·1 bushels upon an area of 1,561,000 acres. A calculation based on these figures shows a total production of 24,000,000 bushels.

Potatoes are reported to have given very disappointing results, the average production being only 59·9 bushels per acre, or smaller than that for any year since 1890. The area under this tuber is returned at about 2,551,000 acres, which would indicate a total production of 154,000,000 bushels.

The hay crop seems to have been about the average. The estimated yield per acre was 1·32 tons per acre over an area of about 38,115,000 acres. From these figures it may be calculated that the aggregate production amounted to about 50,300,000 tons, or practically the same as last year.

The area under wheat shows an advance on last year's figures of close on 1,000,000 acres, and amounts to about 43,000,000 acres. Details of production are not yet available.

Cotton has also been more extensively cultivated this year, the area under this plant amounting to 28,000,000 acres, or 8·3 per cent. in excess of the area returned last year.

CROPS IN RUSSIA.

The Board have received through the Foreign Office a report drawn up by H.M. Consul General at St. Petersburg on the return recently issued by the Imperial Ministry of Agriculture, upon the grain harvest in European Russia, (including Poland and Cis-Caucasia), in 1901. The yield of the principal crops is given in the following table :—

Crop.	1901.	1900.	1899.
	Quarters (000 omitted).		
Wheat, winter	19,423	13,580	17,687
,, spring	22,106	27,043	28,929
Total Wheat	41,529	40,623	46,616
Rye	82,265	97,426	97,18
Oats	61,442	82,516	84,323
Barley	27,446	25,850	27,121
Millet	6,981	22,601	8,722

Winter wheat and barley are thus estimated to have yielded better than in the two preceding years, while spring wheat, rye, oats and millet, shewed a considerable decrease.

In a later despatch H.M. Consul General transmits the estimates of the Central Statistical Committee for 72 provinces of the Empire. The area and production of winter corn only are given, as follows :—

Governments.	Winter Wheat.		Winter Rye.	
	Area.	Production.	Area.	Production.
	Acres.	Quarters.	Acres.	Quarters.
European Russia - -	—	15,135,000	—	78,562,500
Poland - - - - -	—	1,770,000	—	5,835,000
Cis-Caucasia - - -	—	6,060,000	—	907,500
Siberia (4 provinces) -	—	15,000	—	1,117,500
Steppes (4 provinces) -	—	15,000	—	7,500
Total - -	13,839,795	22,995,000	72,016,576	86,430,000

Compared with the average of the preceding five years, the proportion of rye to wheat has diminished. Taking the two crops together, the total yield of winter wheat and rye is about 750,000 quarters above the ten years' mean; so that the production of winter corn in 1901 may be regarded as average.

The harvest appears to have been, on the whole, best in the south-western Governments, and worst in the south-east. The quality of the grain is reported to be about the same as last year, but better in Cis-Caucasia.

The hay crop is estimated, for the 72 provinces, at about 42,000,000 tons.

ARGENTINE HARVEST PROSPECTS.

According to a report received through the Foreign Office, the grain crops in the consular district of Rosario have been seriously affected by the drought which has prevailed throughout the season.

It is stated that the wheat and linseed crops have suffered to so great an extent that their yields are expected to be con

siderably under those of last year. In the northern parts of the province of Santa Fé, and also in Cordoba, the losses to these crops are estimated at fifty per cent., and, should the drought continue, a still greater deficiency is considered probable.

THE FRENCH HARVEST OF 1901.

The official preliminary estimate of the yields of the principal grain crops in France in 1901 have been published in the *Journal Officiel*, and the following table shows the figures in English equivalents, together with the corresponding estimates for the previous year.

Crop.	Area.		Production.	
	1901.	1900.	1901.	1900.
	Acres.	Acres.	Bushels.	Bushels.
Wheat - -	16,770,100	16,642,800	294,808,300	299,821,400
Mixed Corn -	487,500	568,100	8,615,400	10,265,200
Rye - - -	3 442,700	3,647,500	60 438,100	61,581,600
Barley - -	1,948,700	2,070,800	37,682 200	42,264,600
Oats - -	9,549,300	9,799,600	207,002,400	245,062,600

CROPS IN BELGIUM.

The *Moniteur Belge* of the 23rd November last publishes the following data relating to the yield of the principal crops in Belgium in 1901, the quantities being given per acre:—Wheat, 31·1 bushels; rye, 33·3 bushels; winter barley, 47·7 bushels; spring barley, 33·8 bushels; oats, 49·1 bushels; flax, 4·3 cwts. of seed and 4·8 cwts. of fibre; sugar beet, 13 tons; mangolds, 17·8 tons; potatoes, 7·8 tons; clover, 1.8 tons; meadow hay, 1·4 tons.

CROPS IN GERMANY.

The preliminary statement of the areas under the principal crops in Germany, published in Part III. of the *Viertel-jahrshefte*, 1901, shows the following changes:—

Crop.	1901.	1900.	Difference.	
			Acres.	Per Cent.
	Acres.	Acres.	Decrease.	
Winter wheat - -	3,139,652	4,707,304	1,567,652	33·3
Winter rye - -	13,911,156	14,371,169	460,013	3·2
Winter spelt - -	777,237	783,780	6,543	0·8
Clover - - -	4,461,104	4,466,835	5,782	0·1
Lucerne - - -	550,494	566,618	16,124	2·8
Winter rape - -	126,427	173,132	46,705	27·0
			Increase.	
Spring wheat - -	769,946	350,970	418,976	119·4
Spring rye - -	433,759	334,211	99,548	29·8
Barley - - -	4,590,774	4,124,663	466,111	11·3
Oats - - -	10,886,639	10,178 922	707,717	7·0
Potatoes - - -	8,190,152	7,948,850	241,302	3·0
Meadows - -	14,662,612	14,597,653	64,959	0·4
Hops - - -	92,870	91,862	1,008	1·1
Vines - - -	295,313	294,545	768	0·3

Six of these crops thus show a total decrease of 2,102,819 acres, and the other eight an increase of 2,000,388 acres. The decreases in the areas enumerated above are practically entirely due to damage by frost during the preceding winter. Returns previously made show that 1,933,654 acres had been reploughed and resown during the spring, or 169,165 acres less than the total amount of decreases noted in winter crops. Some portion of this difference may have remained untilled from want of seed, labour, or time, or from unsuitability of the soil to carry spring crops, but most of these 169,165 acres have probably been sown with crops of which statistics are not collected annually, such as sugar-beet, mangolds, turnips, vetches, etc.

Of bread-stuffs alone (wheat, rye, and spelt) the deficiency in autumn-sown grain has only been partially supplemented by growing spring wheat and rye, although the two latter exhibit very large proportionate increases. The total

area devoted to bread-stuffs in 1901 shows, as compared with 1900, a decrease of 1,515,683 acres, or 7·4 per cent.

The damage is almost wholly in Prussia, and, in the case of wheat, also in Saxony and Oldenburg.

CROPS IN ROUMANIA.

In the *Monitorul Oficial* of the 5th September last the Roumanian Ministry of Agriculture have published a statement showing the estimated acreage and total production of the principal crops in that country for this year. The estimates for the leading cereal crops are summarised in the following table:—

Crop.	Area.		Production.	
	1901.	Average. 1896 1900.	1901.	Average. 1896-1900.
	Acres.	Acres.	Bushels.	Bushels.
Wheat - -	4,042,296	3,855,546	70,149,310	48,227,300
Rye - - -	522,217	501,830	9,277,537	6,709,725
Barley - -	1,244,134	1,490,521	23,473,793	19,736,475
Oats - - -	654,856	711,977	16,028,512	11,036,300
Colza - -	335,312	192,907	4,174,500	2,123,550
Linseed - -	51,695	57,131	536,814	408,100

The figures given in this table show that this year's harvest was an unusually abundant one in the case of each of the crops dealt with.

CROPS IN POLAND.

H. M. Consul-General at Warsaw reports to the Foreign Office that crops in Poland were this year seriously damaged by the hard winter, although much of the land was resown with spring crops. In the result the wheat, with a yield of 11·5 bushels to the acre, is estimated at about 65 per cent. of an average crop; and rye, with 10·75 bushels, at about 70 per cent. of the normal. Oats were rather above the average, yielding 22·25 bushels per acre, while barley was 10 per cent. below, and gave a return of 15·35 bushels. The

total yield of cereals in Poland in 1901 is given as about 5,000,000 qrs. of rye, 1,572,000 qrs. of wheat, 5,253,000 qrs. of oats, and 1,900,000 qrs. of barley.

The sugar-beet harvest was good; the total yield is returned as 22,559,000 cwts. from 162,400 acres. The potato crop did not turn out so badly as was anticipated, and is described as fairly good on the whole. Hay proved a failure in many districts.

ALGERIAN HARVEST OF 1899-1900.

In his report to the Foreign Office (Annual Series, No. 2,710) on the trade of Algeria for the year 1900, Mr. Hay-Newton furnishes the following information respecting the harvest of that year.

He states that the season may, on the whole, be considered to have given satisfactory results.

The following table shows the acreage and production of the chief cereals in 1900, with comparative figures for the preceding season :—

Crop.	Area.		Production.	
	1900.	1899.	1900.	1899.
	Acres.	Acres.	Tons.	Tons.
Wheat, hard	2,767,630	2,726,355	734,943	494,696
„ soft	525,920	532,600	163,777	102,749
Barley	3,635,995	3,488,835	1,189,557	709,751
Beans	80,180	88,495	16,534	13,973
Oats	231,800	211,575	97,836	64,829
Dari	70,335	70,945	20,790	14,263
Total	7,311,860	7,118,805	2,223,437	1,400,261

From the point of view of live-stock owners, the harvest of 1900 was a favourable one, for there was an abundant yield of fodder. It is, however, to be observed that the exports of sheep and cattle in 1899 showed a noticeable falling off. In that year, 1,044,000 sheep and 38,000 cattle were exported, these figures showing a decrease of 122,000 and 8,000 respectively, as compared with 1898.

AGRICULTURAL RETURNS OF SOUTH AUSTRALIA FOR 1900-01.

The Government Statist of South Australia has recently issued statistics as to the agriculture and live stock of that colony for the past season, 1900-1901. From these figures the following table has been compiled, showing the area and production of the leading crops, together with the number of the more important classes of live stock. Comparative figures have been added for the previous season :—

CROP.	Area.		Production.	
	1900-01.	1899-1900.	1900-01.	1899-1900.
	Acres.	Acres.	Bushels.	Bushels.
Wheat*	1,913,200	1,821,100	11,253,100	8,453,100
Barley*	15,400	15,800	211,100	188,900
Oats*	28,000	20,200	366,200	218,300
Peas	4,500	3,800	67,400	52,900
			Tons.	Tons.
Potatoes	6,600	8,400	14,600	19,700
Hay	341,300	311,400	353,700	229,800
In Fallow	887,500	822,000	—	—
Orchards	16,000	15,500	—	—
Vines	20,200	19,400	—	—

LIVE STOCK.	1900-1901.	1899-1900.
	No.	No.
Horses	166,800	168,700
Cattle { Milch Cows	75,900	83,500
Cattle { Other Cattle	138,800	192,300
Sheep	5,235,200	5,667,300
Pigs	89,700	82,900
Goats	8,900	7,400

* In addition to the areas noted above, 3,000 acres of wheat, barley, and oats in 1900-01, and 1,100 acres in 1899-1900 are stated to have been cut green for forage. In the area for wheat in 1899-1900 are included 339,000 acres which are reported to have been sown, but not reaped.

It is also stated that 6,000,000 lb. of butter and 1,000,000 lb. of cheese were made in the past season.

CROPS IN NEW SOUTH WALES.

In the "Statistical Register" of New South Wales, Part IX. for 1900, statistics are given dealing with agriculture in that Colony for the past and previous seasons. The following table shows the general results of the harvest for the year ended 31st March, 1901, with similar information for the previous year.

It will be observed that wheat is more extensively cultivated in the colony than any other crop. The yield of this cereal for 1900-1 was greater than that recorded for any of the previous nine years, and exceeded the aggregate production of 1899-1900 by 2,500,000 bushels.

Description of Crop.		Area.		Production.	
		1900–1.	1899–1900.	1900–1.	1899–1900.
		Acres.	Acres.	Bushels.	Bushels.
Wheat		1,530,609	1,426,166	16,173,771	13,604,166
Maize		206,051	214,697	6,292,745	5,976,022
Barley		9,435	7,154	114,228	132,476
Oats		29,383	29,125	593,548	627,904
				Tons.	Tons.
Potatoes		29,408	34,968	63,253	81,337
Sugar Cane	Cut this year	10,472	9,435	199,118	170,509
	Not cut this year	11,642	13,082	—	—
				Galls.	Galls.
Grape Vines	For wine-making	4,534	4,602	*891,190	*739,668
				Tons.	Tons.
	For table use	2,689	2,592	4,214	3,652
	Not bearing	1,218	1,084	—	—
				Cases.	Cases.
Oranges	Productive	11,013	10,928	540,523	—
	Not bearing	3,952	—	—	—

* In addition, 11,170 galls. of brandy were made in 1900–1 and 9,624 galls. in 1899–1900.

The live stock census was taken on the 31st of December of last year. The returns showed that there were 481,000 horses, 1,983,000 cattle, 40,021,000 sheep, and 257,000 swine in the colony at the date of the enumeration. The numbers of each description of live stock have, of recent years, shown a tendency to decline; and this is especially noticeable in the case of sheep, whose numbers are now over 20,000,000 less than they were in 1891.

PARLIAMENTARY PUBLICATIONS.

Board of Agriculture : Grants for Agricultural Education and Research. 1900-1901. [*Cd.* 814.] *Price* 11½*d.*

The amount of the grants distributed by the Board to agricultural educational institutions in 1900-1901 in England and Wales was £7,850 ; while a further sum of £200 was paid in grants to agricultural associations for experimental work. The aggregate of the grants was thus £8,050 as compared with £7,750 in the previous year. In 1900-1901, there was, in addition, an expenditure of £294 on special experiments and research. The Report reviews the growth of State aid for agricultural education since 1888 ; and reference is made to the large sums annually placed at the disposal of County Councils and made available for purposes of technical instruction in agriculture, as well as in other industries, under the provisions of the Local Taxation (Customs and Excise) Act of 1890. From an inquiry undertaken by the Board, it appears that there was at the disposal of English and Welsh County Councils in 1899-1900 a sum of over £500,000 for expenditure on technical instruction, and that the sum allotted to agricultural education was approximately £77,000, exclusive of payments made for instruction in agricultural subjects at Evening Continuation Schools. It is estimated therefore that, including the grants distributed by the Board of Agriculture and the small sum disbursed by the Board of Education in grants to Science and Art classes, the aggregate amount of public money expended yearly in England and Wales on agricultural education is between £85,000 and £90,000.

Part II. of the appendix to the Report contains a series of accounts of the results of the principal experiments conducted

by institutions aided by the Board. Among the subjects of these experiments were the application of various manures to grass, roots, and hops; the feeding of sheep and bullocks; the breeding of sheep; the seeding of temporary pastures; and the rotation of crops.

Part III. of the appendix is devoted to a series of statements showing the results of an exhaustive investigation undertaken by the Board into the schemes of agricultural instruction provided by County Councils in England and Wales in 1899-1900. An account is given of the educational work of each county, and this is followed by summaries and tables showing the number of agricultural colleges, farm schools, and dairy institutes aided by grants from County Councils; the nature of the instruction given by migratory lecturers; the character of the experiments carried out by each county; the number of agricultural scholarships and exhibitions awarded; and the total expenditure by County Councils upon agricultural instruction in 1899-1900.

It would appear from the results of this inquiry that instruction by means of migratory lecturers was provided at 2,610 centres in England and Wales in 1899-1900. The subjects of instruction taught at these centres comprised dairying at 297 centres; horticulture at 848 centres; poultry-keeping at 401 centres; bee-keeping at 228 centres; farriery and veterinary science at 229 centres; manual processes, such as hedging, ditching, and ploughing at 227 centres; and general agriculture at 380 centres.

Ten English counties have established their own agricultural teaching institutions, and six of these counties also support other agricultural colleges and farm schools. Two have combined in the establishment of an agricultural college; two others for the maintenance of a joint farm school; and two have a joint dairy school; while twenty-five contribute to the support of agricultural colleges acting for several counties. Nine of the Welsh counties make grants to the Agricultural Department of the University College of North Wales, or to the college at Aberystwith.

The number of agricultural scholarships and exhibitions at agricultural colleges and secondary schools awarded by

County Councils in England and Wales in 1899-1900 was 232; 418 dairy scholarships at dairy schools (including dairy courses), and 76 scholarships in horticulture and poultry-keeping, etc., were also awarded.

The total amount expended by English and Welsh County Councils in the year 1899-1900 upon agricultural education was £79,534. This sum was disbursed approximately as follows:—£10,599 in dairy instruction; £5,991 in agricultural lectures; £2,563 in poultry-keeping instruction; £2,490 in instruction in farriery and veterinary science; £857 in bee-keeping; £10,366 in horticulture; £2,282 in instruction in manual processes; £4,865 in instruction in general agriculture; £8,256 in scholarships; £5,623 in general expenses; and £25,642 in grants in aid of colleges and schools in respect of agricultural instruction provided by them.

Department of Agriculture and Technical Instruction for Ireland. First Annual General Report, 1900-1901. [*Cd.* 838.] *Price* 1*s.* 3*d.*

This, being the first annual report, gives in considerable detail the aims and principles which are intended to guide the action of the Department. It is divided into three heads: (1) Administration and funds, (2) policy and procedure, and (3) details of the Department's operations, together with appendices consisting chiefly of details of schemes for encouraging various industries, circulars issued by the Department, reports of officers, etc. The organisation of the Department is stated to have been carried out, so far as it has gone, in careful observance of the fact that there is an essential unity of purpose behind its various functions, whether these directly concern the development of agriculture and industries, the promotion of technical instruction, the collection and publication of information, or the administration of laws to prevent the spread of cattle diseases, and fraud in the sale of agricultural requirements and produce. The agricultural objects receiving special attention include

education, cattle, horse, and swine breeding, potato cultivation, seeding and manuring experiments, loans for equipping creameries with pasteurising plant, etc.

Report of the Departmental Committee on Food Preservatives. [*Cd.* 833.] *Price* 4*s.* 3*d.*

This is the Report of the Committee appointed by the President of the Local Government Board in 1899 to "enquire into the use of preservatives and colouring matters in the preservation and colouring of food, and to report, (1) whether the use of such materials, or any of them, for the preservation and colouring of food, in certain quantities, is injurious to health, and, if so, in what proportions does their use become injurious; (2) to what extent, and in what amounts, are they so used at the present time."

The Committee state, *inter alia*, that, after very carefully weighing the evidence received by them they have come to the conclusion that as regards the trade in fresh and cured meat, fish, butter, margarine, and other food substances in the consumption of which but small quantities of the antiseptic are taken into the system, there exists no sufficient reason for interfering to prevent the use of boron preservatives. Even butter, of which the imports from all countries except Denmark frequently contain boracic acid, is not consumed in such quantities by individuals as to convey more than a very moderate daily amount of the drug into the system. The evidence satisfied them that the amount of preservative corresponding to 0·5 per cent. of boracic acid is sufficient for the purpose of preserving butter.

But they point out that the circumstances and considerations affecting the milk traffic are very different. Milk, a very perishable substance, peculiarly liable to bacterial contamination, forms a very large proportion of the daily food of the public. The nutrition of infants and young children depends greatly on the purity and abundance of the milk supply; and, seeing how frequently milk is

prescribed for invalids and convalescents, it is of the utmost importance that it should not be the vehicle of any unsuspected agent. While it is possible that milk containing boracic acid in sufficient quantity to act as a preservative (say 30 grains to the gallon), might be consumed to the amount of four or five pints a day without harmful results by most healthy children or adults, there is evidence pointing to an injurious effect of boracised milk upon the health of very young children. Moreover, there exists at present no guarantee against the addition of excessive amounts of preservative to milk. Cases were quoted to the Committee in which the proportion ranged from 42 to 126 grains per gallon, and one case was instanced of a sample containing no less than 80 grains to the pint.

In the opinion of the Committee such random use of any drug in a food calls for regulation. At present milk may be subjected to several successive treatments with preservative before it reaches the consumer. The farmer or producer sometimes applies it, so does the wholesale purveyor, so does the retail dealer; lastly, the domestic use of preservatives is increasing, and has become very general, and hence the milk may receive a fourth dose before it reaches the unsuspecting consumer. A further objection raised in the Report to the use of preservatives in the milk traffic is that they may be relied on to protect those engaged therein against the immediate results of neglect of scrupulous cleanliness. Under the influence of the preservatives milk may be exposed without sensible injury to conditions which otherwise would render it unsaleable. It may remain sweet to taste and smell, and yet have incorporated disease-germs of various kinds, whereof the activity may be suspended for a time by the action of the preservative, but may be resumed before the milk is digested.

It was put before the Committee that it is not possible to supply large towns, especially London, with new milk without the aid of preservatives; but they state that they have received abundant evidence to prove that this is no more than a matter of organisation and system, and that while no doubt the prohibition of preservatives in milk offered for sale would

tend to the disadvantage of small retailers who have no cold storage, this is not a consideration which should stand in the way of a much-needed reform.

With regard to the use of colouring matters for dairy produce the Committee state that in the butter trade, and still more so in the cheese trade, artificial colouring has long been established, and that they have not found that in the interest of the consumer any interference is necessary with the customs of the trade in this respect.

But the same reason which is given for the prohibition of preservatives in milk offered for sale, namely, the large quantity thereof which may be consumed by an individual, appears to the Committee to render it highly undesirable that any colouring matter should be permitted in milk. There is this further consideration, that milk is sold as an absolutely raw, unmanufactured article, of which the purchaser is entitled to be aware of the natural colour, and to draw his own conclusions therefrom as to quality.

In the case of margarine the Committee suggest that, probably, the only means of protecting the public from imposition would be to prohibit the introduction of any colouring matter into margarine which shall cause it to resemble butter. But as the margarine may be assumed to be a perfectly wholesome article of diet, it did not fall within the terms of their reference to make any recommendation upon a practice which is not attended with risk to the public health.

The recommendations of the Committee are as follows :—

(*a*) That the use of formaldehyde or formalin, or preparations thereof, in food or drinks be absolutely prohibited and that salicylic acid be not used in a greater proportion than one grain per pint in liquid food, and one grain per pound in solid food. Its presence in all cases to be declared.

(*b*) That the use of any preservative or colouring matter whatever in milk offered for sale in the United Kingdom be constituted an offence under the Sale of Food and Drugs Acts.

(*c*) That the only preservative which it shall be lawful to use in cream be boric acid or mixtures of boric acid and borax, and in amount not exceeding 0.25 per cent. expressed as

boric acid. The amount of such preservative to be notified by a label upon the vessel.

(*d*) That the only preservative permitted to be used in butter and margarine be boric acid or mixtures of boric acid and borax to be used in proportions not exceeding 0.5 per cent. expressed as boric acid.

(*e*) That in the case of all dietetic preparations intended for the use of invalids or infants chemical preservatives of all kinds be prohibited.

(*f*) That the use of copper salts in the so-called greening of preserved foods be prohibited.

(*g*) That means be provided, either by the establishment of a separate Court of Reference, or by the imposition of more direct obligation on the Local Government Board, to exercise supervision over the use of preservatives and colouring matters in foods, and to prepare schedules of such as may be considered inimical to the public health.

Memoirs of the Geological Survey: Summary of Progress for 1900. *Price* 1s.

The memoir deals largely with the structure and characters of the Highland schists with the marbles of Assynt, with the old red sandstone, associated volcanic rocks and granite of Argyllshire, and with the volcanic rocks of Arran and Skye. Observations are also recorded on the volcanic rocks in the Silurian series of the east and south of Ireland.

There is a summary of the recent work in the South Wales coal-field, with particulars of the coal seams and of the faults which affect the strata near Swansea. The discovery of Radiolarian chert in the lower carboniferous rocks of Gower is mentioned. Details are also given of the work in the North Staffordshire coal-field, and of that which is being carried on in Cornwall and in Devon.

Descriptions are given of the drift and more recent deposits in various parts of Scotland, in South Wales, and in the Southern and Midland Counties of England.

PRICES OF LIVE STOCK.

Returned under the Weighing of Cattle Act.

The number of Cattle, Sheep, and Pigs returned as entering the twenty-one markets of Great Britain scheduled under the Markets and Fairs (Weighing of Cattle) Act, 1891, during the third quarter of the current year showed, in each case, a reduction as compared with the corresponding period of 1900. In the case of sheep the number weighed, which is never large proportionately, was considerably less, but on the

Animals.	3rd Quarter, 1901.	3rd Quarter, 1900.
Cattle :	No.	No.
Entering markets - - - - -	224,506	245,762
Weighed - - - - - - -	33,534	29,817
Prices returned - - - - - -	27,948	25,991
Prices returned with quality distinguished - - - - -	22,771	21,764
Sheep :		
Entering markets - - - - -	1,482,746	1,491,025
Weighed - - - - - - -	9,014	12,381
Prices returned with quality distinguished - - - - -	7,898	10,375
Swine :		
Entering markets - - - - -	71,367	83,424
Weighed - - - - - - -	630	635
Prices returned with quality distinguished - - - - -	630	635

other hand it may be noted that the percentage of cattle returned as weighed during the quarter was slightly larger

than in any previous period recorded. Specific information as to the prices realised is still, however, not furnished for all those which pass over the weighbridges. In the English markets 5 per cent., and in the Scottish markets rather more than 26 per cent. of the total number of cattle entering the markets were priced as well as weighed.

From the table given on p. 416, it will be seen that not a single instance of the use of weighbridge was reported during the three months from the markets of Birmingham, Lincoln, or York; while the returns from Ashford, Bristol, and Norwich were again insignificant.

The average prices per stone and per cwt. of fat cattle weighed at the thirteen markets from which sufficient returns are available are shown in the following table:—

PLACES.	INFERIOR or Third Quality.			GOOD or Second Quality.			PRIME or First Quality.		
	Number.	Price per Stone	Price per Cwt.	Number	Price per Stone	Price per Cwt.	Number.	Price per Stone	Price per Cwt.
		s. d.	*s. d.*		*s. d.*	*s. d.*		*s. d.*	*s. d.*
Carlisle - -	448	3 5½	27 8	345	3 10¼	30 10	959	4 3½	34 4
Leicester - -	—	—	—	30	3 7	28 8	188	4 2½	33 8
Leeds - -	—	--	—	70	3 7¼	28 10	212	4 3	34 0
Liverpool - -	136	3 4	26 8	421	3 11	31 4	1,643	4 3½	34 4
London - -	—	—	—	557	4 3¾	34 6	866	4 8½	37 8
Newcastle- -	—	—	—	164	4 3¾	34 6	249	4 8	37 4
Shrewsbury -	71	3 8½	29 8	273	4 2¾	33 10	64	4 8¼	37 6
Aberdeen - -	1,261	3 2¾	25 10	1,451	4 3	34 0	1,695	4 6¼	36 2
Dundee - -	273	3 2¼	25 6	1,299	4 3¼	34 2	516	4 7¼	36 10
Edinburgh -	—	—	—	3,348	4 4¾	35 2	112	4 9¼	38 2
Falkirk - -	200	4 0½	32 4	406	4 4¼	34 10	262	4 7¼	36 10
Glasgow - -	273	4 3¼	34 2	612	4 4½	35 0	1,719	4 7	36 8
Perth - -	6	4 2¼	33 6	150	4 5	35 4	200	4 8¾	37 10

The range of prices for prime cattle was from 38s. 2d. per cwt. at Edinburgh, to 33s. 8d. per cwt. at Leicester, while in the case of cattle of second quality the highest average was returned at Perth, 35s. 4d. per cwt., and the lowest at Leicester, 28s. 8d. per cwt. For cattle of the third quality

Glasgow shows an average of 34s. 2d., per cwt., and Dundee of 25s. 6d. per cwt. The statistics suggest, however, that the classification or grading of the stock is not made on quite the same basis at all the markets concerned.

PLACES.	INFERIOR or Third Quality.		GOOD or Second Quality.		PRIME or First Quality.	
	1901.	1900.	1901.	1900.	1901.	1900.
	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.
Carlisle	27 8	27 8	30 10	31 4	34 4	34 10
Leicester	—	32 8	28 8	31 4	33 8	34 0
Leeds	—	30 0	28 10	30 10	34 0	35 6
Liverpool	26 8	—	31 4	31 8	34 4	36 4
London	—	29 2	34 6	35 0	37 8	38 10
Newcastle	—	29 0	34 6	36 4	37 4	39 0
Shrewsbury	29 8	29 8	33 10	33 8	37 6	37 0
Aberdeen	25 10	28 4	34 0	35 10	36 2	39 0
Dundee	25 6	28 10	34 2	36 0	36 10	39 4
Edinburgh	—	—	35 2	37 2	38 2	39 10
Falkirk	32 4	30 10	34 10	35 6	36 10	38 6
Glasgow	34 2	33 2	35 0	35 0	36 8	38 4
Perth	33 6	34 4	35 4	37 4	37 10	40 0

A comparison of these averages with those for the same period last year—which is made in the above table—shows a distinctly lower level of prices than was recorded in 1900. This is still more clearly indicated in the next table, which gives the average price month by month of first and second quality cattle respectively at all the thirteen selected markets. It appears that not only has the general level of values been markedly below that which prevailed in the third quarter of last year, but that there has been a comparative absence of the fluctuations which distinguished the cattle trade in 1900.

The number of actual transactions at an agreed price per live stone or per live cwt. is still limited—the total reported at all markets during the quarter being 2,560, nearly one-half of these transactions occurring at Glasgow.

The use of the weighbridge in connection with the sale of store cattle was reported from only three places—Shrewsbury, Edinburgh, and Leicester—the number of such animals weighed and priced being 1,780.

Months.	Good or Second Quality.		Prime or First Quality.	
	1901.	1900.	1901.	1900.
	PER CWT. s. d.	PER CWT. s. d.	PER CWT. s. d.	PER CWT. s. d.
January - - -	34 8	34 8	36 2	37 2
February - - -	34 6	34 6	35 10	36 8
March - - - -	34 2	34 2	36 0	36 0
April - - - -	34 2	33 8	36 0	35 10
May - - - -	34 2	35 6	36 0	37 4
June - - - -	34 8	37 6	36 4	39 2
July - - - -	34 8	36 10	36 4	38 8
August - - -	34 10	36 0	36 0	37 8
September - - -	33 10	35 2	35 6	36 10

The usual table, furnishing details for each of the scheduled places, is given on the next page.

CATTLE, SHEEP, and SWINE *entering and weighed at the Markets and Marts of the undermentioned Places in the* THIRD QUARTER *of* **1901**, *as returned under the Markets and Fairs* (*Weighing of Cattle*) *Act*, 1891 (54 & 55 *Vict. c.* 70).

PLACES.	Cattle. Total Number entering the Markets or Marts.	Cattle. Number Weighed.	Cattle. Number Weigh'd for which Prices were given.	Sheep. Total Number entering the Markets or Marts.	Sheep. Number Weighed.	Sheep. Number Weigh'd for which Prices were given.	Swine. Total Number entering the Markets or Marts.	Swine. Number Weighed.	Swine. Number Weigh'd for which Prices were given.
ENGLAND.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Ashford	3,087	6	—	32,367	—	—	4,458	—	—
Birmingham	4,358	—	—	33,290	—	—	36,595	—	—
Bristol	4,678	18	18	33,025	—	—	—	—	—
Carlisle	6,667	1,752	1,752	104,944	—	—	2,777	—	—
Leicester	10,849	262	238	24,129	—	—	1,051	—	—
Leeds	7,753	282	282	34,825	—	—	—	—	—
Lincoln	1,736	—	—	17,091	—	—	2,126	—	—
Liverpool	12,555	2,200	2,200	189,620	1,564	1,564	2	1	1
London	17,335	3,551	1,423	131,830	1,083	10	810	—	—
Newcastle-upon-Tyne	23,511	413	413	131,858	23	23	6,833	555	555
Norwich	12,289	15	—	61,346	—	—	1,062	—	—
Salford	25,817	966	—	197,136	—	—	1,267	—	—
Shrewsbury	12,361	2,416	1,730	41,219	—	—	6,459	—	—
Wakefield	19,412	1,943	494	51,989	—	—	887	—	—
York	7,659	—	—	34,829	—	—	468	—	—
SCOTLAND.									
Aberdeen	10,243	4,407	4,407	85,604	5,658	5 658	177	—	—
Dundee	4,159	2,088	2,088	7,418	251	251	665	—	—
Edinburgh	14,316	7,597	*3,898	56,099	—	—	1,983	—	—
Falkirk	2,020	868	868	3,810	—	—	29	—	—
Glasgow	13,350	2,916	2,604	142,194	161	118	809	—	—
Perth	10,351	1,834	*356	68,123	274	274	2,909	74	74
TOTAL for ENGLAND	170,067	13,824	8,550	1,119,498	2,670	1,597	64,795	556	556
TOTAL for SCOTLAND	54,439	19,710	*14,221	363,248	6,344	6,301	6,572	74	74
Total	224,506	33,534	*22,771	1,482,746	9,014	7,898	71,367	63	630

* Prices for 3,699 cattle in addition to the above were quoted from Edinburgh and for 1,478 cattle from Perth, but without distinguishing the quality.

PRICES OF MEAT, CORN, AND DAIRY PRODUCE.

Average Prices of Dead Meat, per 8 lbs., at the London Central Meat Market, during the Third Quarter of 1901, and during the Months of September, October, and November, 1901.

(*Compiled from the prices quoted weekly in the Meat Trades' Journal.*)

Description.	3rd Quarter 1901.	September 1901.	October 1901.	November 1901.
	s. d. s. d.	*s. d. s. d.*	*s. d. s. d.*	*s. d. s. d.*
Beef:—				
Scotch, short sides	4 3 to 4 6	4 3 to 4 5	4 3 to 4 7	4 3 to 4 6
„ long sides	4 0 „ 4 2	4 0 „ 4 2	4 0 „ 4 2	3 11 „ 4 1
English	3 9 „ 3 11	3 10 „ 4 0	3 7 „ 3 10	3 7 „ 3 10
Cows and Bulls	2 0 „ 3 3	2 3 „ 3 4	2 0 „ 3 2	2 0 „ 3 1
American Birkenhead killed	3 7 „ 3 9	3 8 „ 3 10	3 4 „ 3 8	3 5 „ 3 8
„ Deptford killed	3 7 „ 3 10	3 8 „ 3 11	3 5 „ 3 9	3 6 „ 3 10
American Refrig. hind-quarters	3 8 „ 3 11	3 10 „ 4 1	3 8 „ 4 0	3 10 „ 4 1
„ „ fore-quarters	2 2 „ 2 5	2 6 „ 2 9	1 11 „ 2 3	2 8 „ 2 10
Australian, Frozen hind-quarters	2 4 „ 2 5	— „ 2 6	2 2 „ 2 3	2 0 „ 2 2
„ „ fore-quarters	— „ 1 6	— „ 1 10	— „ 1 7	1 6 „ 1 7
New Zealand „ hind-quarters	2 6 „ 2 8	2 7 „ 2 8	2 6 „ 2 8	2 7 „ 2 8
„ „ fore-quarters	1 7 „ 1 8	1 11 „ 2 0	1 9 „ 1 10	1 9 „ 1 10
River Plate „ hind-quarters	2 6 „ 2 7	2 6 „ 2 7	2 4 „ 2 6	2 4 „ 2 6
„ „ fore-quarters	1 7 „ 1 9	1 10 „ 2 0	1 9 „ 1 10	1 8 „ 1 9
Mutton:—				
Scotch, Prime	4 4 „ 4 9	4 3 „ 4 7	4 3 „ 4 7	4 3 „ 4 7
English, Prime	4 0 „ 4 6	3 11 „ 4 4	3 11 „ 4 4	3 9 „ 4 4
Ewes	3 2 „ 3 6	2 10 „ 3 3	2 9 „ 3 3	2 8 „ 3 2
Continental	3 10 „ 4 2	3 5 „ 3 10	3 7 „ 4 0	3 6 „ 3 11
New Zealand, Frozen	1 11 „ 2 8	2 2 „ 2 8	1 11 „ 2 8	1 10 „ 2 7
Australian, Frozen	1 10 „ 2 0	2 2 „ 2 3	2 0 „ 2 2	1 10 „ 1 11
River Plate, Frozen	1 11 „ 2 0	2 3 „ 2 4	2 2 „ 2 3	2 0 „ 2 2
Lamb:—				
English	4 6 „ 5 5	4 2 „ 5 0	— „ —	— „ —
New Zealand, Frozen	3 2 „ 3 7	3 0 „ 3 5	2 9 „ 3 2	2 8 „ 3 1
Veal:—				
English	4 3 „ 4 7	4 0 „ 4 5	4 3 „ 4 7	4 3 „ 4 7
Foreign	3 2 „ 4 1	2 11 „ 3 10	3 0 „ 4 0	3 5 „ 4 1
Pork:—				
English, best	4 2 4 6	4 6 „ 4 11	4 8 „ 5 1	4 6 „ 4 11
„ secondary Foreign	3 5 „ 3 11	3 7 „ 4 3	3 8 „ 4 3	3 7 „ 4 2

AVERAGE WHOLESALE PRICES of CATTLE and SHEEP, per 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during the under-mentioned Quarters of 1900 and 1901.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
3rd Quarter, 1900	3 2	4 3	4 11	3 3	5 4	6 0
4th Quarter, ,,	2 11	4 2	4 10	3 2	5 1	5 10
1st Quarter, 1901	2 4	3 11	4 7	3 4	5 2	6 0
2nd Quarter, ,,	2 4	3 11	4 6	3 3	4 9	5 7
3rd Quarter, ,,	2 4	4 0	4 7	3 2	4 9	5 7

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during the under-mentioned Quarters of 1900 and 1901.

PERIOD.	LIVERPOOL.*		GLASGOW.†	
	BEEF.	MUTTON.	BEEF.	MUTTON.
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
3rd Quarter, 1900	2 8 to 4 0	3 4 to 5 0	3 0 to 3 10	4 0 to 4 10
4th Quarter, ,,	2 8 ,, 3 10	3 0 ,, 4 10	3 0 ,, 3 10	3 0 ,, 4 8
1st Quarter, 1901	2 8 ,, 3 11	3 6 ,, 5 4	3 0 ,, 3 10	4 4 ,, 5 4
2nd Quarter, ,,	2 10 ,, 3 8	4 8 ,, 5 8	3 4 ,, 3 10	4 2 ,, 5 2
3rd Quarter, ,,	3 0 ,, 3 11	3 8 ,, 5 0	3 0 ,, 3 10	3 8 ,, 4 8

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals *slaughtered at the Liverpool Abattoir*, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College, Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Dead Weight), in the BERLIN CATTLE MARKET in the undermentioned Months of 1901.

MONTHS.	CATTLE.		SHEEP.		SWINE.	
	Per Cwt.		Per Cwt.		Per Cwt.	
1901.	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
August - - - -	60	1	62	9	59	6
September - - -	62	9	62	9	60	4
October - - - -	60	5	61	3	61	4

NOTE.—The above prices are compiled from the Wholesale Prices quoted in the *Monatliche Nachweise über den Auswärtigen Handel des deutschen Zollgebiets.* The prices for swine are live weight prices with 20 per cent. tare.

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality), per cwt., in the PARIS CATTLE MARKET in the undermentioned Months of 1901.

MONTHS.	OXEN.		CALVES.		SHEEP.		PIGS.	
	Per Cwt.		Per Cwt.		Per Cwt.		Per Cwt.	
LIVE WEIGHT.								
1901.	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
September - - -	29	8	40	11	36	4	35	3
October - - -	29	4	44	2	35	9	30	9
November - - -	28	9	44	7	36	8	32	9
DEAD WEIGHT.								
1901.	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
September - - -	48	6	68	3	72	8	50	1
October - - -	49	3	74	1	73	0	43	8
November - - -	47	7	74	4	72	11	46	8

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique.*

CHICAGO

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1901.

Month.	Good Dressed Beef and Shipping Steers.					Export Cattle.					Extra Prime Cattle.				
1901.	s.	d.		s.	d.	s.	d.		s.	d.	s.	d.		s.	d.
September -	25	9	to	28	10	25	4	to	29	8	29	6	to	30	9
October - -	26	3	,,	31	0	26	6	,,	31	0	31	2	,,	32	0
November -	25	8	,,	31	3	26	2	,,	32	0	32	3	,,	33	0

Compiled from the Live Stock Reports issued by John Clay, Jr., of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in the under-mentioned Quarters of 1900 and 1901.

(*Computed from the Trade and Navigation Accounts.*)

PERIOD.	BEEF. Fresh.		BEEF. Salted.		MUTTON. Fresh.		PORK. Fresh.		PORK. Salted.		BACON.		HAMS.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
3rd Quarter, 1900 -	39	1	25	10	34	6	42	1	22	10	43	7	47	10
4th Quarter, ,, -	39	7	26	1	36	4	43	7	25	2	44	10	47	5
1st Quarter, 1901 -	40	9	25	8	37	9	43	2	27	10	45	1	46	8
2nd Quarter ,, -	39	5	25	10	36	6	43	8	25	7	47	3	47	7
3rd Quarter ,, -	39	4	26	3	37	2	43	5	24	4	46	9	49	11

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1901, 1900, and 1899.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1901.	1900.	1899.	1901.	1900.	1899.
Wheat.						
	s. d.	*s. d.*	*s. d.*	*Quarters.*	*Quarters.*	*Quarters.*
Lady Day - - -	26 3	25 11	26 3	744,018	868,378	868,579
Midsummer - - -	27 1	25 9	25 1	547,737	854,497	994,293
Michaelmas - - -	26 11	28 7	25 2	535,109	511,347	754,667
Christmas - - -	—	27 4	26 4	—	689,261	913,421
Barley.						
	s. d.	*s. d.*	*s. d.*	*Quarters.*	*Quarters.*	*Quarters.*
Lady Day - - -	25 3	25 1	27 1	844,616	888,949	830,398
Midsummer - - -	24 9	24 3	24 6	53,403	93,157	92,648
Michaelmas - - -	24 0	24 5	24 4	236,164	143,552	237,935
Christmas - - -	—	25 11	26 6	—	2,065,135	2,135,762
Oats.						
	s. d.	*s. d.*	*s. d.*	*Quarters.*	*Quarters.*	*Quarters.*
Lady Day - - -	17 6	16 7	16 11	236,316	246,949	251,841
Midsummer - - -	19 3	18 2	17 6	81,172	110,163	137,834
Michaelmas - - -	18 7	18 7	17 3	131,023	116,880	147,902
Christmas - - -	—	17 0	16 4	—	237,791	238,783

* Section 8 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local inspector of Corn Returns in any other measure than the imperial bushel or by weight or by a weighed measure, that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 39 imperial pounds for every bushel of oats.

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1901, and in the corresponding Weeks in 1900 and 1899.

Weeks ended (*in 1901*).	Wheat.			Barley.			Oats.		
	1901.	1900.	1899.	1901.	1900.	1899.	1901.	1900.	1899.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Jan. 5 -	26 5	25 9	27 0	25 4	25 7	28 3	17 2	16 2	17 0
,, 12 -	26 7	25 11	27 2	25 6	25 5	28 2	17 3	16 3	17 1
,, 19 -	26 11	26 0	27 0	25 9	25 8	27 11	17 3	16 2	17 1
,, 26 -	26 10	25 10	26 7	25 6	25 9	27 9	17 6	16 4	17 0
Feb. 2 -	26 7	25 8	26 6	25 7	25 4	27 2	17 8	16 6	17 0
,, 9 -	26 8	25 10	26 8	25 7	25 3	27 2	17 7	16 5	17 0
,, 16 -	26 4	26 1	26 0	25 4	24 11	26 10	17 7	16 8	16 11
,, 23 -	26 1	26 3	25 7	25 0	25 1	26 7	17 7	16 9	16 11
Mar. 2 -	25 11	26 4	25 8	25 0	24 6	26 7	17 9	16 10	17 0
,, 9 -	25 9	25 11	25 10	25 4	24 8	26 7	17 7	16 11	16 11
,, 16 -	25 9	25 10	25 10	25 1	24 6	26 3	17 7	16 11	16 10
,, 23 -	25 8	25 11	25 4	24 11	25 0	26 8	17 9	17 1	17 0
,, 30 -	26 0	25 10	24 11	24 9	24 11	26 2	18 0	17 2	16 11
Apl. 6 -	26 3	25 10	24 7	25 3	24 10	25 1	18 0	17 2	16 11
,, 13 -	26 5	25 11	24 6	26 0	24 5	25 7	18 1	17 8	16 10
,, 20 -	26 8	26 0	24 8	25 7	24 9	25 2	18 8	17 3	17 1
,, 27 -	26 8	26 0	25 0	25 8	25 2	25 10	18 8	17 11	17 5
May 4 -	26 9	25 11	25 3	26 4	25 3	24 5	19 1	18 0	17 6
,, 11 -	27 3	25 11	25 4	26 2	24 10	23 11	19 1	17 11	17 9
,, 18 -	27 7	25 7	25 3	24 2	24 5	23 11	19 4	18 5	17 10
,, 25 -	27 7	25 5	25 2	24 1	23 11	23 8	19 8	18 2	17 8
June 1 -	27 7	25 5	25 4	23 8	24 4	24 4	19 9	18 6	18 1
,, 8 -	27 6	25 3	25 6	22 9	23 8	21 10	20 1	18 8	18 2
,, 15 -	27 8	25 6	25 7	24 0	23 8	23 1	19 7	18 11	17 10
,, 22 -	27 6	25 9	25 7	23 2	23 5	26 2	20 3	18 11	17 11
,, 29 -	27 6	26 11	25 7	25 4	23 4	24 2	20 0	19 3	18 0
July 6 -	27 8	27 10	25 7	21 9	22 10	21 9	19 10	19 5	18 1
,, 13 -	27 2	28 7	25 5	23 10	23 2	20 4	19 9	19 1	17 11
,, 20 -	27 3	29 0	25 5	23 4	23 8	21 10	19 11	19 3	18 0
,, 27 -	27 3	29 3	25 2	22 1	24 4	22 5	19 4	19 9	18 2
Aug. 3 -	27 6	28 10	24 10	23 1	23 10	20 9	20 0	19 4	18 0
,, 10 -	27 7	28 7	24 8	22 1	23 7	22 6	19 4	19 8	17 9
,, 17 -	27 4	28 10	24 7	27 2	23 3	26 11	18 9	19 11	17 4
,, 24 -	27 3	28 10	24 7	23 7	24 10	26 5	18 1	18 8	17 1
,, 31 -	27 0	28 8	25 0	24 3	25 2	25 10	17 10	18 1	16 7
Sept. 7 -	26 5	28 7	25 5	25 1	25 8	26 5	17 6	17 10	16 6
,, 14 -	26 2	28 4	25 4	24 11	25 4	27 1	17 4	17 1	16 2
,, 21 -	26 0	28 4	25 4	25 5	26 0	27 4	17 4	17 1	16 1
,, 28 -	25 10	28 9	25 6	25 10	26 1	26 11	17 2	17 2	16 5
Oct. 5 -	25 8	28 9	26 0	26 3	26 2	28 0	17 7	16 10	16 5
,, 12 -	25 9	28 9	27 3	26 5	26 2	27 9	17 6	17 1	16 5
,, 19 -	25 10	28 4	28 2	26 8	26 5	27 6	17 8	16 11	16 10
,, 26 -	25 11	27 11	28 1	26 10	26 3	27 4	17 5	16 11	16 3
Nov. 2 -	26 2	27 5	27 2	26 10	26 3	27 2	17 7	16 11	16 7
,, 9 -	26 6	27 3	26 7	27 0	25 11	26 9	17 8	16 10	16 5
,, 16 -	26 9	27 1	26 1	26 9	25 8	26 4	18 3	17 1	16 7
,, 23 -	27 1	27 2	25 8	26 10	25 10	26 2	18 7	17 0	16 7
,, 30 -	27 1	27 0	25 7	26 9	25 9	25 10	18 9	17 2	16 6
Dec. 7 -	27 1	26 10	25 7	26 7	25 11	25 10	19 0	17 4	16 5
,, 14 -	27 2	26 9	25 4	26 8	25 7	25 7	19 3	17 1	16 1
,, 21 -		26 7	25 6		25 7	25 10		17 2	16 0
,, 28 -		26 4	25 9		25 10	25 5		17 2	16 2

AVERAGE PRICES of WHEAT, BARLEY, and OATS, per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1901.

Month.	Wheat.	Barley.	Oats.
1901.	*s.* *d.*	*s.* *d.*	*s.* *d.*
August - - - - - -	28 3	21 4	19 10
September - - - - -	—	—	—
October - - - - - -	—	—	—

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge.*

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES, in the under-mentioned Months of 1901.

MONTH.	FRANCE.	ENGLAND.
WHEAT.		
1901.	Per Qr. *s.* *d.*	Per Qr. *s.* *d.*
September - - - - - -	35 9	26 1
October - - - - - -	35 5	25 9
November - - - -	35 4	26 8
BARLEY.		
1901.	Per Qr. *s.* *d.*	Per Qr. *s.* *d.*
September - - - - - -	23 1	25 3
October - - - - - -	22 10	26 6
November - - - - - -	22 11	26 10
OATS.		
1901.	Per Qr. *s.* *d.*	Per Qr. *s.* *d.*
September - - - - - -	21 10	17 4
October - - - - - -	21 9	17 6
November - - - - - -	21 10	18 2

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique.* The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER at LONDON, PARIS and BERLIN in the under-mentioned Months of 1901.

Month.	London.		Paris.		Berlin.	
			WHEAT.			
1901.	Per Qr.		Per Qr.		Per Qr.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
August - - - - - -	28	2	35	0	36	3
September - - - - -	27	2	37	1	34	10
October - - - - - -	26	7	36	9	34	0
November - - - - -	27	6	36	8	—	
			BARLEY.			
1901.	Per Qr.		Per Qr.		Per Qr.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
August - - - - - -	24	1	23	1	24	3*
September - - - - -	29	0	23	3	23	5*
October - - - - - -	33	7	23	1	23	2*
November - - - - -	29	6	22	11	—	
			OATS.			
1901.	Per Qr.		Per Qr.		Per Qr.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
August - - - - - -	19	0	22	2	19	3
September - - - - -	18	0	22	9	19	2
October - - - - - -	18	4	23	0	19	6
November - - - - -	19	2	23	1	—	

Note.—The London quotations represent the price of British corn as returned under the Corn Returns Act, 1882; the prices of grain in Paris have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the quotations for Berlin are the average prices published monthly in the *Monatliche Nachweise über den Auswärtigen Handel des deutschen Zollgebiets.*

* Prices at Breslau; no quotations for Berlin.

PRICES OF WOOL.

AVERAGE PRICES of ENGLISH WOOL, per pack of 240 lbs., in the under-mentioned Months of 1901.

(Compiled from the *Economist.*)

DESCRIPTION.	September, 1901.					October, 1901.					November, 1901.				
	£	*s.*		£	*s.*	£	*s.*		£	*s.*	£	*s.*		£	*s.*
South Down -	7	0	to	8	10	7	0	to	8	10	7	0	to	8	10
Half-breds - - -	6	0	,,	7	0	6	0	,,	7	0	5	4	,,	6	10
Leicester - - -	5	0	,,	5	15	5	0	,,	5	15	5	0	,,	5	10
Kent Fleeces - -	5	10	,,	6	0	5	10	,,	6	0	5	2	,,	6	0

MEAN WHOLESALE PRICES of BUTTER, MARGARINE, and CHEESE in the under-mentioned Months of 1901.

(Compiled from the *Grocer*.)

DESCRIPTION.	September, 1901.					October, 1901.					November, 1901.				
	Per Cwt.					Per Cwt.					Per Cwt.				
BUTTER:	s.	d.		s.	d.	s.	d.		s.	d.	s.	d.		s.	d.
Cork, 1sts	91	6		—		97	0		—		99	6		—	
,, 2nds	86	6		—		90	0		—		91	6		—	
,, 3rds	80	0		—		83	0		—		86	0		—	
,, 4ths	73	0		—		73	6		—		75	0		—	
Irish Creamery*	103	6	to	107	6	110	0	to	113	6	110	6	to	114	6
Friesland	107	0	,,	109	0	111	6	,,	114	6	110	6	,,	112	6
Dutch Creameries	109	6	,,	113	0	116	0	,,	119	0	112	0	,,	114	6
French Baskets	108	0	,,	112	0	111	0	,,	116	6	109	0	,,	114	0
,, Crocks and Firkins	94	0	,,	100	0	98	6	,,	106	0	99	0	,,	107	0
,, 2nds and 3rds	84	0	,,	90	0	88	6	,,	97	0	80	0	,,	95	0
Danish and Swedish	118	6	,,	122	0	125	0	,,	128	0	119	6	,,	123	0
Finnish	90	0	,,	99	6	95	0	,,	103	0	102	6	,,	110	6
Russian and Siberian	78	0	,,	95	0	79	0	,,	99	0	74	6	,,	99	0
Canadian and States	75	0	,,	108	6	77	0	,,	112	6	77	0	,,	110	0
Colonial, fine	—			—		—			—		111	0	,,	116	6
,, good and inferior	—			—		—			—		91	0	,,	106	6
Fresh Rolls (Foreign) per doz.	10	6	,,	14	0	10	9	,,	14	9	11	0	,,	15	0
MARGARINE	36	0	,,	56	0	36	0	,,	58	0	36	0	,,	58	0
CHEESE:															
Cheddar, new	55	0	,,	71	6	55	0	,,	72	0	56	0	,,	72	0
,, Loaf	65	0	,,	66	0	65	0	,,	67	0	65	0	,,	68	0
Wiltshire, Loaf	66	0	,,	68	0	66	0	,,	68	0	67	0	,,	69	0
Double Gloucester	51	6	,,	56	0	53	6	,,	58	6	56	0	,,	58	0
Derby, Factory	57	0	,,	59	0	56	6	,,	60	0	59	0	,,	62	0

* These prices are the averages of the official quotations of the Price Committee of the Irish Co-operative Agency at Limerick for the choicest Irish pure creamery butter.

WEEKLY PRICES (WHOLESALE) of VEGETABLES and FRUIT at COVENT GARDEN MARKET in each week of November, 1901.

(Compiled from the *Gardeners' Chronicle*.)

Description.	Week ending November 2.	November 9.	November 16.	November 23.	November 30.
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s d.
VEGETABLES—					
Artichokes, Globe, per doz.	2 6 to 3 0	3 0 to 4 0	3 0 to 3 6	4 6 —	3 0 —
,, Jerusalem, per sieve	1 6 —	1 6 —	1 6 —	1 0 to 1 6	1 0 to 1 6
Beetroots, new, per bushel	1 6 —	1 6 —	1 6 —	1 3 ,, 1 6	1 3 ,, 1 6
Brussels Sprouts, sieve	1 0 ,, 2 0	1 0 ,, 2 0	1 0 ,, 2 0	1 0 ,, 1 6	1 0 ,, 2 6
Cabbage, tally	2 6 ,, 5 0	3 0 ,, 5 0	3 0 ,, 5 0	3 0 ,, 5 0	3 0 ,, 5 0
Carrots, per dozen bunches	2 0 ,, 2 6	2 0 ,, 2 6	2 0 ,, 2 6	2 0 ,, 2 6	2 0 ,, 2 6
,, washed, bags	2 6 ,, 3 0	2 6 ,, 3 0	2 6 ,, 3 0	2 6 ,, 3 0	2 6 ,, 3 0
,, unwashed bag	1 6 ,, 2 0	1 6 ,, 2 0	1 6 ,, 2 0	2 0 —	1 6 ,, 2 0
Cauliflowers, pr. doz.	1 6 ,, 1 9	1 6 ,, 2 3	1 6 ,, 2 3	1 6 ,, 2 6	2 0 ,, 2 6
,, tally	4 0 ,, 7 0	5 0 ,, 8 0	5 0 ,, 8 0	5 0 ,, 10 0	8 0 ,, 10 0
Celery, 12 bundles	9 0 ,, 12 0	9 0 ,, 12 0	9 0 ,, 12 0	9 0 ,, 12 0	9 0 ,, 12 0
Cress, per dozen punnets	1 6 —	1 6 —	1 6 —	1 6 —	1 3 —
Cucumbers, per doz.	2 0 ,, 4 0	2 0 ,, 4 0	2 0 ,, 3 0	2 0 ,, 3 0	2 0 ,, 3 6
Leeks, per doz. bun.	1 0 ,, 1 6	1 0 ,, 1 6	1 0 ,, 1 6	1 0 ,, 1 6	1 0 ,, 1 6
Lettuces, Cabbage, per doz.	1 0 —	1 0 —	1 0 —	1 0 —	1 0 —
Onions, cases	5 0 ,, 5 6	6 0 —	5 6 ,, 6 0	5 6 ,, 6 0	6 0 ,, 6 6
,, in bags	3 0 ,, 4 6	3 0 ,, 4 6	3 0 ,, 4 6	4 6 ,, 5 0	5 0 ,, 5 6
,, bun., per doz.	3 0 —	3 0 —	3 0 —	— —	— —
Parsley, per doz. bunches	1 0 —	1 0 ,, 1 6	1 0 —	1 0 —	1 0 ,, 1 6
,, sieve	0 6 ,, 0 9	0 9 ,, 1 0	0 9 ,, 1 0	0 6 ,, 0 9	0 6 ,, 0 9
Parsnips, per cwt. bags	2 6 ,, 3 0	2 6 ,, 3 0	2 6 ,, 3 0	2 6 ,, 3 0	2 6 ,, 3 0
Potatoes, per ton	50 0 ,, 70 0	50 0 ,, 80 0	45 0 ,, 80 0	45 0 ,, 90 0	45 0 ,, 90 0
Radishes, per doz. bunches	1 0 —	1 0 —	1 0 —	1 0 —	1 0 —
Salad, small, punnets, per doz.	1 3 —	1 3 —	1 3 —	1 3 —	1 3 —
Savoys, tally	5 0 ,, 6 0	5 0 —	5 0 ,, 6 0	5 0 ,, 7 0	4 0 ,, 7 0
Spinach, English, bushel	1 9 —	1 0 ,, 1 9	1 0 —	1 6 ,, 2 0	1 6 ,, 2 0
Tomatoes, English, per doz. lbs.	1 9 ,, 4 6	2 6 ,, 4 6	4 0 ,, 5 0	4 0 ,, 4 6	3 0 ,, 3 6
Turnips, per dozen bunches	1 6 ,, 2 0	1 6 ,, 2 0	1 6 ,, 2 0	1 6 ,, 2 0	1 6 ,, 2 0
,, bag	2 0 ,, 2 6	2 0 ,, 2 6	2 0 2 6	2 0 ,, 2 6	1 6 ,, 2 0
Watercress, per dozen bunches	0 4 ,, 0 6	0 6 —	0 6 —	0 6 —	0 6 —
FRUIT—					
Apples, home grown, sieve	2 0 ,, 3 6	2 0 ,, 3 6	2 0 ,, 3 6	6 0*,, 10 0	6 0*,, 10 0
,, Cox's, sieve	4 0 ,, 7 0	4 0 ,, 7 0	4 0 ,, 8 0	4 0 ,, 8 0	5 0 ,, 8 0
,, Ribstons, sieve	2 6 ,, 4 0	2 6 ,, 4 0	2 6 ,, 4 0	2 6 ,, 4 0	2 6 ,, 3 6
,, King Pippins, bushel	6 0 ,, 7 6	5 6 ,, 6 0	6 0 ,, 7 0	5 0 ,, 6 6	5 0 ,, 6 6
,, Large Cookers, bushel	5 0 ,, 5 6	5 0 ,, 5 6	5 0 ,, 5 6	5 0 ,, 5 6	5 0 ,, 5 6
Chestnuts, per bag	3 6 ,, 17 0	7 0 ,, 17 0	4 0 ,, 15 0	5 0 ,, 15 0	4 0 ,, 13 0
Cobnuts, Kentish, per lb.	0 8 —	0 8 ,, 0 8½	0 8½,, 0 9	0 8½ —	0 8½ —
Cranberries, pr. case	12 0 —	11 0 —	11 0 —	11 0 —	11 0 —
Grapes, Muscats, home grown, per lb., A.	2 0 ,, 2 6	1 6 ,, 2 0	2 6 ,, 3 6	2 0 ,, 2 6	2 0 ,, 2 6
,, ,, B.	0 8 ,, 1 0	0 8 ,, 1 0	0 8 ,, 1 3	0 8 ,, 1 3	0 6 ,, 0 9
,, Alicante, pr. lb.	0 6 ,, 1 0	0 6 ,, 1 0	0 6 ,, 1 0	0 6 ,, 1 0	0 6 , 1 0
,, Gros Colmar, per lb.	0 10 ,, 1 6	0 8 ,, 1 3	A 1 3 ,, 1 6 B 0 6 ,, 0 9	A 1 6 ,, 2 0 B 0 6 ,, 0 9	A 1 6 ,, 1 9 B 0 6 ,, 0 9
,, Gros Maroc, per lb.	0 8 ,, 1 3	0 8 ,, 1 0	— —	— —	— —
,, Belgian Black, per lb.	0 4 ,, 0 6	— —	— —	— —	— —
Melons, each	1 0 ,, 2 0	0 9 ,, 2 0	1 0 ,, 2 0	1 0 ,, 2 0	0 3 ,, 1 6
Pears, English Calabasse, Bergamont, &c., pr. bus.	4 0 ,, 8 0	4 0 ,, 8 0	4 0 ,, 8 0	— —	— —
Pines, each	2 6 ,, 4 0	2 6 ,, 4 0	1 6 ,, 3 6	2 6 ,, 3 6	2 0 ,, 3 0

* Per Bushel.

DISEASES OF ANIMALS IN GREAT BRITAIN.

NUMBER of OUTBREAKS of **Foot-and-Mouth Disease** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Board of Agriculture, in GREAT BRITAIN in each of the under-mentioned periods.

Quarter ended	Foot-and-Mouth Disease.		Swine-Fever.	
	Outbreaks Confirmed.	Animals Attacked.	Outbreaks Confirmed.	Swine Slaughtered as Diseased, or as having been exposed to Infection.
	No.	*No.*	*No.*	*No.*
March, 1900	7	99	438	4,980
June, 1900	2	24	736	7,600
September, 1900	7	102	409	2,622
December, 1900	5	41	357	2,731
March, 1901	10	652	625	3,165
June, 1901	2	17	1,490	7,066
September, 1901	—	—	680	3,391

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax** and **Glanders** in GREAT BRITAIN in each of the under-mentioned periods.

Quarter ended	Anthrax.		Glanders (including **Farcy**).	
	Outbreaks Reported.	Animals Attacked.	Outbreaks Reported.	Animals Attacked.
	No.	*No.*	*No.*	*No.*
March, 1900	140	213	259	486
June, 1900	163	279	286	461
September, 1900	109	224	315	474
December, 1900	159	240	259	437
March, 1901	163	223	322	571
June, 1901	193	281	327	551
September, 1901	114	164	398	676

NUMBER OF CASES of **Rabies** in DOGS in GREAT BRITAIN during each of the under-mentioned periods.

Three Months ended	Number of Cases.
31st March, 1900	—
30th June, 1900	—
30th September, 1900	3
31st December, 1900	3
31st March, 1901	1
30th June, 1901	—
30th September 1901	—

DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Department of Agriculture and Technical Instruction in IRELAND, in each of the undermentioned periods.

QUARTER ENDED	Pleuro-Pneumonia. Out-breaks Confirmed.	Pleuro-Pneumonia. Cattle found Diseased.	Pleuro-Pneumonia. Cattle Slaughtered as having been exposed to Infection.	Swine-Fever. Out-breaks Confirmed.	Swine-Fever. Swine Slaughtered as Diseased, or as having been exposed to Infection.
	No.	*No.*	*No.*	*No.*	*No.*
March, 1900	—	—	—	40	702
June, 1900	—	—	—	78	1,394
September, 1900	—	—	—	69	1,036
December, 1900	—	—	—	39	577
March, 1901	—	—	—	64	1,265
June, 1901	—	—	—	67	1,242
September, 1901	—	—	—	72	1,089

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax**, **Glanders**, and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax. Out-breaks Reported.	Anthrax. Animals Attacked.	Glanders (including Farcy). Out-breaks Reported.	Glanders (including Farcy). Animals Attacked.	Rabies. Cases Reported. Dogs.	Rabies. Cases Reported. Other Animals.
	No.	*No.*	*No.*	*No.*	*No.*	*No.*
March, 1900	1	6	4	5	7	—
June, 1900	1	1	3	7	4	1
September, 1900	—	—	1	1	1	—
December, 1900	—	—	2	2	5	1
March, 1901	—	—	1	1	1	—
June, 1901	1	2	3	3	—	1
September, 1901	—	—	—	—	—	—

ORDNANCE SURVEY MAPS OF GREAT BRITAIN AND IRELAND.

The Ordnance Survey are issuing a new series of folding pocket maps for England and Wales on the scale of one inch to the mile. The maps are printed in colours on sheets 18 by 12 inches, mounted on canvas, in a cover or flat, price 1s. each. The one-inch map can also be procured at the same price in black and white, showing outline and contours; or in outline, with hills printed either in black or brown: the outline map has recently been revised. These maps are not only useful for general topographical purposes, but should also prove serviceable to cyclists and pedestrians, since they show all roads, indicating their character and whether metalled or not, footpaths, hills, rivers, towns, villages, railway stations, and local boundaries.

Combined one-inch outline maps have also been published of Bath, Birmingham, Bournemouth, Bradford, Brighton and Worthing, Bristol, Chatham, Clovelly, Derby, Dorchester and Portland, Gloucester and Cheltenham, Huddersfield, Leeds, Leicester, Liverpool, London, Manchester, Nottingham, Plymouth, Rugby, Sheffield and the Peak, Warrington, Warwick and Leamington, Weymouth, Winchester, Aberdeen, Dundee, Glasgow, the Isle of Wight, the Lake District of England, the New Forest, and South-East Kent. Additional maps are in course of preparation.

These combined maps are based on the revised one-inch map. In most cases they are being published folded in covers, and with the principal roads coloured, at prices varying from 1s. to 1s. 6d.

Cheap maps of counties, groups of counties, or districts are also being published on the ¼-inch scale, with main roads coloured, at 6d. plain, or 9d. if folded in a cover.

There are agents for the sale of Ordnance Survey Maps in most of the chief towns, and maps can be ordered and indexes, etc., seen at many Head Post Offices, in places where there are no agents. They can also be ordered, through any bookseller, from the Director-General, Ordnance Survey, Southampton; or, in the case of Ireland, from the Officer in Charge, Ordnance Survey, Dublin.

THE "LABOUR GAZETTE."

The "Labour Gazette," the Journal of the Labour Department of the Board of Trade, contains an article each month on the state of employment among agricultural labourers in the various parts of the United Kingdom. Special articles also appear therein from time to time on the rates of wages paid to agricultural labourers, the Hiring Fairs in Great Britain, and on migratory Irish agricultural labourers. The "Labour Gazette" is issued on the 15th of each month, and may be obtained direct from the Publishers, Messrs. Horace Marshall and Son, Temple House, Temple Avenue, London, E.C., at the rate of 2s. per annum, post free. Copies may also be ordered through any newsagent, price 1d. each.

POST OFFICE SAVINGS BANKS, WITH GOVERNMENT SECURITY.

Advantages Offered for Old Age Pensions.

Provision for old age can be made by buying Savings Bank Deferred Annuities from £1 to £100 to begin at any age selected.

Return of Purchase Money. The Premiums for Deferred Annuities can be returned on application, or on Death before the Annuity begins, if the Contract is taken out on these conditions.

Immediate Pensions. Annuities to begin at once, of any amount from £1 to £100 a year, can be bought through the Post Office Savings Bank. The Purchase Money is payable in a lump sum which is not returnable, and the Pensions are payable half-yearly.

Savings Banks Annuities are payable by half-yearly instalments on the 5th January and the 5th July, or the 5th April and 10th October, according to the date of purchase.

Procedure. A simple form of Proposal, and a form for statement of age, can be obtained at any Post Office Savings Bank. When filled up the forms will be forwarded by the local Postmaster to the Chief Office, London, and a Contract will be issued when the first premium has been paid. Annuity Premiums are payable in the same way as Insurance Premiums, namely, by transfers from Savings Bank accounts,

OLD AGE PENSIONS.—IMMEDIATE LIFE ANNUITIES.

This Table shows the cost of an Immediate Life Annuity of £1, and an Annuity of a larger amount costs a larger sum in exact proportion. For instance, a Pension of £10 a year would cost ten times the amount given below.

AGE at time of Purchase.	Males. Cost of an Immediate Annuity of £1. £ s. d.	Females. Cost of an Immediate Annuity of £1. £ s. d.
5 and under 6	25 19 0	27 12 6
6 ,, 7	25 15 1	27 9 1
7 ,, 8	25 11 1	27 5 8
8 ,, 9	25 7 0	27 2 2
9 ,, 10	25 2 11	26 18 8
10 ,, 11	24 18 10	26 15 1
11 ,, 12	24 14 9	26 11 6
12 ,, 13	24 10 6	26 7 10
13 ,, 14	24 6 4	26 4 1
14 ,, 15	24 2 1	26 0 4
15 ,, 16	23 17 10	25 16 6
16 ,, 17	23 13 6	25 12 7
17 ,, 18	23 9 1	25 8 8
18 ,, 19	23 4 9	25 4 8
19 ,, 20	23 0 4	25 0 8
20 ,, 21	22 15 10	24 16 6
21 ,, 22	22 11 4	24 12 4
22 ,, 23	22 6 9	24 8 1
23 ,, 24	22 2 3	24 3 10
24 ,, 25	21 17 7	23 19 5
25 ,, 26	21 12 11	23 15 0
26 ,, 27	21 8 3	23 10 6
27 ,, 28	21 3 6	23 5 11
28 ,, 29	20 18 9	23 1 3
29 ,, 30	20 13 11	22 16 6
30 ,, 31	20 9 1	22 11 8
31 ,, 32	20 4 2	22 6 9
32 ,, 33	19 19 2	22 1 9
33 ,, 34	19 14 2	21 16 7
34 ,, 35	19 9 2	21 11 5
35 ,, 36	19 4 1	21 6 2
36 ,, 37	18 18 11	21 0 9
37 ,, 38	18 13 9	20 15 3
38 ,, 39	18 8 6	20 9 7
39 ,, 40	18 3 2	20 3 11
40 ,, 41	17 17 10	19 18 0
41 ,, 42	17 12 4	19 12 1
42 ,, 43	17 6 10	19 5 11
43 ,, 44	17 1 4	18 19 8

AGE at time of Purchase.	Males. Cost of an Immediate Annuity of £1. £ s. d.	Females. Cost of an Immediate Annuity of £1. £ s. d.
44 and under 45	16 15 8	18 13 3
45 ,, 46	16 9 11	18 6 9
46 ,, 47	16 4 2	18 0 0
47 ,, 48	15 18 3	17 13 2
48 ,, 49	15 12 3	17 6 1
49 ,, 50	15 6 1	16 18 11
50 ,, 51	14 19 11	16 11 9
51 ,, 52	14 13 6	16 4 7
52 ,, 53	14 7 1	15 17 4
53 ,, 54	14 0 5	15 9 11
54 ,, 55	13 13 8	15 2 4
55 ,, 56	13 6 9	14 14 9
56 ,, 57	12 19 8	14 6 11
57 ,, 58	12 12 5	13 19 0
58 ,, 59	12 4 11	13 11 1
59 ,, 60	11 17 4	13 3 1
60 ,, 61	11 9 8	12 15 1
61 ,, 62	11 2 2	12 7 0
62 ,, 63	10 14 11	11 19 0
63 ,, 64	10 7 8	11 11 0
64 ,, 65	10 0 6	11 2 11
65 ,, 66	9 13 4	10 14 7
66 ,, 67	9 6 4	10 6 4
67 ,, 68	8 19 7	9 18 1
68 ,, 69	8 12 10	9 9 10
69 ,, 70	8 6 2	9 1 10
70 ,, 71	7 19 5	8 14 2
71 ,, 72	7 12 10	8 6 10
72 ,, 73	7 6 4	7 19 10
73 ,, 74	7 0 1	7 13 0
74 ,, 75	6 14 1	7 6 4
75 ,, 76	6 8 4	6 19 10
76 ,, 77	6 2 8	6 13 7
77 ,, 78	5 17 4	6 7 5
78 ,, 79	5 12 3	6 1 6
79 ,, 80	5 7 2	5 15 9
80 or any greater age.	5 2 4	5 10 3

LIST OF LEAFLETS ISSUED BY THE BOARD OF AGRICULTURE.

(a.) *Leaflets dealing with Insects and Fungi.*

No.	Title.	No.	Title.
1	Mites on Currant and Nut Trees.	33	Surface Caterpillars.
2	Vine and Raspberry Weevils.	34	The Woolly Aphis or American Blight.
3	The Turnip Fly or Flea.	35	The Celery Fly.
4	Caterpillars on Fruit Trees.	38	The Carrot Fly.
5	The Mangel Wurzel Fly.	41	The Red Spider or Spinning Mite.
10	Wireworms.	46	The Stem Eelworm.
11	The Daddy Longlegs.	47	The Asparagus Beetle.
12	The Gooseberry Saw-Fly.	48	The Pea Thrips.
14	The Raspberry Moth.	49	The Fruit Tree Beetle.
15	The Apple Blossom Weevil.	52	Gooseberry Blight.
16	The Apple Sucker.	53	The Pear Midge.
19	Pea and Bean Weevil.	56	The Canker Fungus.
20	The Magpie Moth.	60	The Wood Leopard Moth.
21	The Warble Fly.	62	Pear and Cherry Saw-Fly.
22	The Diamond Back Moth.	64	White Root Rot.
23	Potato Disease.	65	The Small Ermine Moths.
24	The Ribbon Footed Corn-Fly.	68	Currant Aphides.
25	The Cockchafer.	69	Tent Caterpillars.
30	The Codlin Moth.	70	Winter Washing of Fruit Trees.
31	The Onion Fly.		

(b.) *Leaflets dealing with Birds useful to Agriculture.*

40	The Kestrel or Windhover.	45	The Starling.
42	The Short-Eared Owl.	50	Water Wagtails or "Dishwashers."
43	Titmice.	51	The White or Barn Owl.
44	The Common Lapwing, Plover, or Peewit.	54	The Spotted Flycatcher.
		55	The Swallow.

(c.) *Leaflets dealing with Diseases of Animals.*

28	Anthrax.	37	Rabies.
29	Swine Fever.	61	Sheep Scab.

(d.) *Leaflets relating to Acts of Parliament.*

8	Farmers and Assessments to Local Rates.	27	Remission of Tithe Rentcharge.
18	Fertilisers and Feeding Stuffs Act.	39	Assessment to Land Tax.
26	Farmers and the Income Tax.	59	Improvement of Land Act, 1899.
		66	Workmen's Compensation Act, 1900.

(e.) *Leaflets dealing with Miscellaneous Subjects.*

6	The Field Vole.	57	External Parasites of Poultry.
9	Ensilage.	58	Internal Parasites of Poultry.
13	Acorn Poisoning.	63	Destruction of Charlock.
32	Foul Brood or Bee Pest.	67	Favus in Poultry.
36	Cultivation of Osiers.		

Copies of these leaflets may be obtained free of charge and post free on application to the Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W. Letters of application so addressed need not be stamped.

THE JOURNAL
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THE BRITISH CROPS OF 1901.

In the last number of the *Journal* particulars were given of the estimated produce of the three principal grain crops, wheat, barley, and oats, in Great Britain in 1901. The returns, now available, of the remaining crops for which estimates of yield are collected, enable the whole of the results of the year's harvest to be summarised in the following table:—

Crop.	Yield per Acre.	Above or Below Average.	Crop.	Yield per Acre.	Above or Below Average.
	Bushels.	Bushels.		Tons.	Tons.
Wheat - -	30·84	+0·91	Potatoes - - -	6·36	+0·51
Barley - -	30·98	—2·15	Turnips - - -	12·26	—0·63
Oats - -	36·74	—1·73	Mangold - - -	19·49	+2·01
				Cwts.	Cwts.
Beans - -	24·16	—2·54	Hay from clover etc., -	25·48	—2·08
Peas - -	25·96	+0·10	Hay from permanent grass	16·63	—5·57
			Hops - - - -	12·70	+4·14

It will be seen that only in five cases—wheat, peas, potatoes, mangolds, and hops—did the estimated yield per acre last year exceed the standard average based on the ten preceding years, and one of the crops thus distinguished, hops, affects an area so comparatively limited as not greatly to affect a review of the agricultural position of the country generally.

Taking in detail the crops to which reference has not previously been made, it will be observed that Beans were more deficient than any other cereal crop, the yield being

F F

$2\frac{1}{2}$ bushels per acre below the average of the decade and about 4 bushels less than that of the preceding year.

Beans.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre, 1891–1900.
	1901.	1900.	1901.	1900.	
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
England - - -	5,602,000	6,928,000	23·63	27·88	26·40
Wales - - - -	26,000	33,000	21·76	25·34	24·52
Scotland - - -	439,000	427,000	34·37	32·89	32·31
Great Britain - -	6,067,000	7,388,000	24·16	28·11	26·70

The crop of Peas was one of those which may be considered satisfactory, although the excess above the average was only one-tenth of a bushel. The quantity of this crop grown in Scotland is so small that it has but a trifling effect on the general result, but it will be observed that the yield in that country was appreciably better than in England and Wales.

Peas.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre, 1891-1900.
	1901.	1900.	1901.	1900.	
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
England - - -	3,947,000	3,995,000	26·03	25·94	25·92
Wales - - -	31,000	34,000	19·53	21·65	19·41
Scotland - - -	29,000	32,000	26·11	25·21	24·74
Great Britain -	4,007,000	4,061,000	25·96	25·89	25·86

An excess above the ten years' average of half-a-ton per acre in the estimated yield of Potatoes affords some set-off against the failure of other crops, and is the more welcome as it follows immediately upon the very deficient crop of

1900. In Scotland the yield exceeded the average by a ton per acre, and was twice as much as this above the crop of the preceding year. The yield of Potatoes in that country was, with the exception of the crop of 1898, the largest on record.

Potatoes.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre, 1891–1900.
	1901.	1900.	1901.	1900.	
	Tons.	Tons.	Tons.	Tons.	Tons.
England - - -	2,628,000	1,986,000	6·33	5·00	5·96
Wales - - -	182,000	153,000	5·70	4·61	5·70
Scotland - - -	861,000	596,000	6·62	4·54	5·57
Great Britain -	3,671,000	2,735,000	6·36	4·87	5·85

In the case of Turnips and Swedes also Scottish farmers fared better than their southern brethren, for while the estimated yield in England was more than a ton per acre below the decennial average, north of the Tweed it was estimated at half a ton in excess. On the comparatively small acreage of Wales the excess over the average was even greater than in Scotland.

Turnips and Swedes.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre, 1891–1900.
	1901.	1900.	1901.	1900.	
	Tons.	Tons.	Tons.	Tons.	Tons.
England - -	12,449,000	15,855,000	10·88	13·66	12·08
Wales - - -	947,000	966,000	15·28	15·34	14·67
Scotland - - -	7,018,000	7,139,000	15·30	15·34	14·81
Great Britain - -	20,414,000	23,960,000	12·26	14·19	12·89

Mangolds, although falling short by a ton per acre of the remarkable yield of 1900, were still, so far as the country

generally was concerned, the best crop of the year, the estimated production being two tons per acre in excess of the average.

Mangold.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre, 1891-1900.
	1901.	1900.	1901.	1900.	
	Tons.	Tons.	Tons.	Tons.	Tons.
England - - -	7,543,000	8,243,000	19·54	20·51	17·51
Wales - - - -	176,000	171,000	17·98	17·37	16·07
Scotland - - -	55,000	49,000	18·71	18·34	17·33
Great Britain - -	7,774,000	8,463,000	19·49	20·42	17·48

The Hay crop, both from arable and pasture land, was very disappointing. From clovers and rotation grasses the estimated yield of hay per acre was 2 cwts. below the average and about 3½ cwts. below the yield of the preceding year. Scotland, however, was again more fortunate than the rest of the country, the yield being there nearly one cwt. above the ten years' average.

Hay cut from Clover, and Rotation Grasses.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre, 1891-1900.
	1901.	1900.	1901.	1900.	
	Tons.	Tons.	Cwts.	Cwts.	Cwts.
England - - - -	2,125,000	2,261,000	24·56	28·29	27·21
Wales - - - -	201,000	244,000	19·96	24·75	22·86
Scotland - - -	676,000	683,000	31·87	33·64	31·10
Great Britain -	3,002,000	3,188,000	25·48	28·96	27·56

In the case of meadow hay the general deficiency was still more serious, the estimated yield falling below the average by no less than 5½ cwts. per acre, and representing, with the one exception of 1893, the smallest crop recorded in Great Britain.

Hay cut from Permanent Grass.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre. 1891-1900.
	1901.	1900.	1901.	1900.	
	Tons.	Tons.	Cwts.	Cwts.	Cwts.
England - - -	3,107,000	4,670,000	16·55	24·73	22·49
Wales - - - -	325,000	463,000	14·01	19·91	17·90
Scotland - - -	184,000	207,000	27·97	31·44	28·32
Great Britain - -	3,616,000	5,340,000	16·63	24·42	22·20

In continuation of the statement given in December for wheat, barley and oats, the following table showing the average yield per acre of the other crops for which estimates are collected in each of the agricultural divisions of England may be of interest:—

Agricultural Divisions.	Estimated Yield per Acre.						
	Beans.	Peas.	Potatoes.	Turnips and Swedes.	Mangold.	Hay from Clover, etc.	Hay from Permanent Pasture.
ENGLAND.	Bushels.	Bushels.	Tons.	Tons.	Tons.	Cwts.	Cwts.
Division I. :—							
(a) Beds., Hunts., Cambs., Suffolk, Essex, Herts., Middx., London - -	23·45	24·57	6·10	9·31	16·38	22·96	15·49
(b) Norfolk, Lincoln, York, (E.R.) - - - -	28·86	30·38	6·22	9·81	18·07	22·91	18·07
Total	25·18	26·87	6·17	9·68	17·15	22 93	16·36
Division II. :—							
(a) Kent, Surrey, Sussex, Berks., Hants - -	25·52	26·70	6·02	10·43	19·92	23·52	12·35
(b) Notts., Leicester, Rutland, Northants., Bucks., Oxford, Warwick - -	17·59	23·89	6·00	8·86	19·13	24·10	13·48
Total	19·69	25·57	6·01	9·70	19·60	23·78	12·94
Division III. :—							
(a) Salop, Worcester, Gloster., Wilts., Monmouth, Hereford - -	21·99	25·07	6·83	12·21	22·63	24·05	14·89
(b) Somerset, Dorset, Devon, Cornwall - -	26·76	21·60	6·58	13·35	23·58	19·70	15·90
Total	23·18	24·63	6·70	12·77	23·27	22·05	15·32
Division IV. :—							
(a) Northum'd., Durham, York (N.R.), York (W.R.) - - - -	25·69	24·52	5·98	11·18	20·26	28·05	19·39
(b) Cumber'd., Westmor'd., Lancashire, Stafford, Cheshire, Derby - -	22·23	24·14	6·82	13·87	22·90	31·27	21·50
Total	24·95	24·43	6·50	12·08	21·71	29·90	20·52

THE SEEDING OF GRAIN.

Owing to differences in seed, soil, and climate, all farming operations vary immensely in one part of the country compared with another. In none of these are there greater differences than in the seeding of grain, to the consideration of a few of which this article principally refers. The amount of seed which it is necessary to use to give the maximum crop must be such as will give the requisite number of stalks per square yard or acre. That number of stalks varies considerably according to soil, season, and climate, but what that number is few have any idea, although the ordinary practical farmer can, from experience, very often tell whether a crop on his land is too thick or too thin to produce the maximum yield. Some land and seasons can carry a larger number of stalks than others, without weakening the straw or reducing the production of grain ; but, as a rule, any increase of stalks over a certain number not only reduces the length and strength of the straw, but the yield of grain also. On the other hand, any material lessening of the number of stalks from the profitable maximum will cause a corresponding diminution of crop in an unfavourable year, while in a favourable one there may be no diminution. Under favourable conditions, the ears are larger on a thin crop than on a thick one, and both may yield an equal quantity of grain. In this way, slightly thin crops so accommodate themselves to the circumstances that in a good year there is little, if any, diminution, although in an indifferent one there may be a considerable shortage. Therefore, in seeding grain, the aim should be to produce such a number of stalks, after taking variety, seed, soil, and situation into account, as may reasonably be expected to give the maximum yield in a season under average rather than over average.

The chief points to keep in view in determining the quantity of seed to sow are the following:—The tillering or stalk-producing power of the variety; the size of the seeds, that is, the number of seeds in a lb. or bushel, compared with seed of the same variety grown under different conditions, or the seed of a different variety grown under the same conditions; the percentage of germination; whether the seed is new to the land, or has been grown on it previously; the firmness or lightness of the land; the condition in which it is at the time of seeding; the date of sowing; and whether the seed is sown broadcast or drilled.

Tillering.

Some varieties have this power developed in an extraordinary degree, while in others it is almost nil. Most varieties of barley or wheat differ little in this respect, but in oats it is most marked. For this characteristic the most noticeable variety is probably Tam Findlay, a long oat, with a thin husk, and extra good straw, which, as a rule, is only grown extensively in the dairying districts of Ayrshire, and on similar land in the neighbouring counties. In the districts where it is grown the land is generally heavy and the climate wet, and damage by the grub of the daddy-long-legs or crane fly is frequent, and often severe. Under these circumstances, it occasionally happens that the plants are so thinned that each may be many inches from its neighbour. The tillering power of this variety is, however, so great that, with land in good condition, and with a favourable season, full crops have often been reaped from fields which at one time did not look like being over half seeded. Under such circumstances it is quite common to find from five to ten stalks issuing from a single plant, the stalks being usually very thick and the crop late.

The oat in largest cultivation in Scotland is the Potato, with its sub-varieties, Hamilton and Longhoughton, each of which has the power of tillering well developed. With such varieties, or others having similar powers, when, from any cause whatever, a crop is thinly planted, the production of stalks is somewhat delayed, but each plant ultimately

sends up a number in proportion to the food, time and space at its disposal. In this way there is a sort of compensating element between thick and thin sowing, the thin-sown crop always producing a greater number of stalks in proportion to the seed sown than the thickly sown one, with a correspondingly greater quantity of grain per bushel of seed sown.

While the above is correct regarding the varieties named, and several others, it is not so with regard to every oat, as there are many varieties which are very feeble in regard to tillering power. The old black Tartarian is very weak in this respect, as is also the more recently introduced Tartar King. The consequence is that in practice from a quarter to a third more seed of these and similar varieties is sown than where strong tillering ones are used. In an ordinary crop Black Tartarian and Tartar King only occasionally throw up over two stalks per plant, and in many cases only one, whereas Tam Findlay and Potato, under similar circumstances, will have from two to four. In 1899 Professor McAlpine, of the West of Scotland Agricultural College, sowed seven grains of twelve varieties of oats in pots filled with loamy soil, and set the pots side by side in garden soil, in order to test the tillering power of each under similar circumstances. The following is a condensed summary of the results given in the Report of the West of Scotland Agricultural College for 1900:—

Name of Variety.	Total Number of Shoots Grown. Seven Grains Sown.	Total Number of Full-sized Matured Shoots.	Total Number of Immature Shoots.
*Providence - - - - -	41	16	25
Potato - - - - - -	18	11	7
Potato (grown in pit sand) -	38	23	15
Sandy - - - - - -	65	30	35
Hamilton - - -	57	30	27
Longhoughton - - -	20	12	8
Newmarket - - - - -	27	16	11
Tam Findlay - - - - -	84	44	40
†Tartar King - - - -	16	16	0
†Pioneer - - - - - -	17	12	5
†Banner (Canadian) - - -	30	24	6
Improved Ligowo (Canadian) -	38	18	20
Black Tartarian - - -	20	20	0

* One of the plants of this variety produced smutty ears.

† In Tartar King and Pioneer two of the grains failed to germinate, and in Banner one grain failed. To make the results comparable with the others, allowance has been made for this failure of germination.

Size of Seeds.

Another disturbing element in the quantity of seed which should be sown in order to produce a certain thickness of crop, is the size of the grain of each particular variety. The following table clearly illustrates this, the grains referred to being the produce of 1898, the weighing being done by me the following spring.

Weight of 100 *Grains of Several Varieties of Oats.**

Variety.	Where Grown.	Number of Grammes.	Times Tried.
Abundance - - - - - -	Paisley -	4·510	1
,, - - - - - -	Shropshire -	3·964	1
,, - - - - - -	Canada -	2·859	1
Newmarket - - - - - -	Ayrshire -	3·966	1
Tartar King - - - - - -	Newton -	4·100	2
,, - - - - - -	England -	4·123	1
Pioneer (black) - - - - - -	Newton -	4·050	2
Waverley - - - - - -	,, -	4·052	2
,, - - - - - -	England -	3·370	1
Goldfinder - - - - - -	,, -	3·805	1
†Tam Findlay (40 lb. per bushel) -	Ayrshire -	3·100	2
Potato - - - - - - -	Newton -	2·962	3
American Beauty - - - -	Canada -	2·865	1

† This variety is usually under this weight in the districts where it is most largely grown, but in most localities capable of producing good grain it may weigh from 40 to 42 lb. per bushel.

The above table shows that given single bushels of the same weight and percentage of growth, as many plants might be expected from a seeding of $2\frac{1}{2}$ bushels of American Beauty, similar to that tested above, as from $4\frac{1}{2}$ bushels of Abundance similar to the sample from Paisley. Also a seeding of 3 bushels per acre of the Potato oats grown at Newton in that year might have been expected to give as many plants as $4\frac{1}{2}$ bushels per acre of Abundance from Paisley. It does not, however, follow, even where the germination is similar, that the plants from large or small seeds will be equal in strength. This difference in the size or plumpness of particular varieties of grain, or of the same variety from different districts, explains a good deal of the variation in the

* From the Transactions of the Highland and Agricultural Society of 1900, page 231.

quantity of seed used in different localities. This matter is referred to by Principal R. Patrick Wright, of the West of Scotland Agricultural College, in Bulletin No. 5, in the Report on the experiments carried out by the College Staff in 1899. The following table from that Report gives some very interesting and valuable information, and is worthy of comparison with the results obtained by me, as detailed in the Highland and Agricultural Society's Transactions of 1900:—

Quantity of Seed of each variety of Oat.

Name of Variety.	Weight of Seed per Bushel.	Weight of 500 Seeds or Grains in Grammes.	Weight of Grain Sown of each Variety to give 2,610,000 Seeds per Acre.	Number of Bushels (approximately) which contained 2,610,000 Seeds.
	lbs.	grammes.	lbs.	bushels.
Providence	45	14·5	166¼	3⅔
Potato	45	15·7	180	4
Sandy	44¼	14·58	167½	3¾
Hamilton	45¼	16·45	188¾	4
Longhoughton	45½	16·15	185	4
Newmarket	44½	21·40	245	5½
Tam Findlay	41¼	13·50	155	3¾
Tartar King	49½	21·55	247½	5
Pioneer (black)	51	19·50	223¾	4⅓
Banner (Canadian)	40½	16·51	188¾	4¾
Ligowo (Canadian)	41¾	17·45	200	5
Abundance (Canadian)	42¾	15·45	176	4
Black Tartarian	43	16·20	186¼	4⅓
Golden Giant (Canadian)	42½	13·60	156¼	3⅔
Siberian (Canadian)	42½	14·45	166¼	4
American Beauty (Canadian)	42	14·60	167½	4
Waverley	—	17·95	206¼	—

The variations to the above table are well marked, yet they only represent one of the influences which have to be taken into account in deciding the quantity of seed which should be sown per acre. Grain ripened in a warm climate, or even in a cool climate like Scotland, where grown on sandy soil, is usually much smaller in size of grain than where the ripening is slower or the more heavy soil. For instance, note the low weight per 500 grains of all the Canadian varieties, also compare the weight of 500 seeds of

Abundance grown in Canada with an equal number grown at Paisley or Newton in the table on page 442.

In an experiment carried out in 1893 and 1894 at one of the Government Experimental Farms in Canada, oats gave a much greater yield drilled at the rate of 2 bushels per acre than at $2\frac{1}{2}$ bushels. In the southern counties of England $2\frac{1}{2}$ to $3\frac{1}{2}$ bushels of oats is a common quantity to sow per acre, in the best districts of Scotland $3\frac{1}{2}$ to 4 bushels is usual where the seed is drilled, and $4\frac{1}{2}$ to 5 bushels where it is sown broadcast by hand or machine, while in some districts and with some varieties, 5 to 6 bushels are commonly sown per acre broadcasted by hand.

Germination of the Seed.

In the above remarks on the quantity of seed which it has been presumed should be sown to get certain results, every seed was calculated to grow. It is well known that this is not always the case, for many seeds are killed through being badly saved, improperly ripened, or by damage during the thrashing and dressing, and occasionally by being too old. These are defects which are usually quite visible in the grains, and need not specially be referred to here, as well ripened, properly kept, thrashed and dressed grain usually has from 97 to 98 per cent. or over of germinating seeds.

Change of Seed.

As to the benefits of a change of seed, everybody is practically of the same opinion. There is, however, considerable difference of opinion as to whether seed gives the best return the first or second year after being changed. Those who maintain that the principal gain is in the second year do so on the ground that the plant is then acclimatised to the change, that it yields better, and that the cost of seeding is much reduced. I cannot refer to any reliable tests that have been carried out which prove or disprove this belief. In 1900, and again in 1901, plots of $\frac{1}{4}$ acre were sown with various oats grown on this farm, and brought from a distance in

order to throw some light on this question. The results of 1900 were as follows, per acre :—

Variety.	Weight per Bushel.	Dressed Grain.	Light Grain.	Total Bushels.	Straw and Chaff.
	lbs.	bushels.	bushels.	bushels.	cwts.
Abundance, new seed - -	40	$65\frac{29}{40}$	$2\frac{20}{40}$	$68\frac{9}{40}$	$42\frac{81}{112}$
,, home seed - -	39	$53\frac{38}{40}$	$1\frac{34}{40}$	$55\frac{32}{40}$	$44\frac{7}{112}$
Waverley, new seed - -	39	$57\frac{5}{40}$	$3\frac{6}{40}$	$60\frac{11}{40}$	$41\frac{49}{112}$
,, home seed - -	38	$50\frac{26}{40}$	$2\frac{24}{40}$	$53\frac{10}{40}$	$39\frac{35}{40}$
Average of new seed - -	$39\frac{1}{2}$	$61\frac{17}{40}$	$2\frac{33}{40}$	$64\frac{10}{40}$	$42\frac{9}{112}$
,, home seed - -	$38\frac{1}{2}$	$52\frac{12}{40}$	$2\frac{9}{40}$	$54\frac{21}{40}$	$41\frac{77}{112}$
Gain in favour of new seed -	1	$9\frac{5}{40}$	$\frac{24}{40}$	$9\frac{29}{40}$	$\frac{44}{112}$

Quality of the Land.

Land in good condition, and more especially if it is composed of a good sound loam, always produces plants which tiller well. Land in poor condition manurially, or of a light and porous nature, rarely produces a crop which tillers much.

For these reasons, sound loams in good condition can be seeded much thinner, and yet produce a much thicker crop, than lighter or poorer soils. Owing to the fine seed-bed usually afforded by sandy soils, these usually seem thickly planted as the seed comes through the ground, while, owing to feeble tillering power, the crop seems to get thinner as it gets older, while with a sound loam it is quite the reverse.

Date of Sowing.

Early sown crops tiller much better than late sown ones, if neither the earliness nor lateness is carried to such an extreme as to interfere with the growth of the crop. This, in great part, seems to be brought about by the early sown plant having time to produce a tuft or stool, and, being thoroughly rooted, it is then in a position to gather food easily, before the period of rapid growth arrives. In the case of a late sown plant, there is neither time to form a stool nor to throw up many stalks before the period of principal growth is past. Very late sown spring crops usually tiller little or not at all, and,

consequently, should always be sown with an extra quantity of seed.

Broadcasting and Drilling.

In the southern half of England grain of all kinds is usually sown by the drill, but the farther you go north, drilling gradually decreases, and broadcasting, principally by hand, gradually increases. In the best farming districts of Scotland drills are used on a few farms and broadcast sowing-machines on others, but the great bulk of grain is there sown by hand. In some districts the custom is to sow with one hand, but throughout a large part of the country the prevailing method is to use both hands. It is as easy to learn to sow with both hands as with one, and when learned it is not only more expeditious, but the seed is more uniformly distributed. The small extent to which the grain drill is used in Scotland is in great part accounted for by the damp and fickle climate, which necessitates pushing on the work when a favourable opportunity occurs.

Since the introduction of the American patterns of chilled ploughs, with concave mould boards and broad shares, it has been found that, while most land may be ploughed cheaper with them than with the swing plough, they break up the furrow so much, that if the seed is sown broad-cast, it is very difficult to readily and effectively cover it. This has necessitated an extra expenditure for seed, and in order to prevent loss in that way, drills are now being used in districts where previously they were unheard of. The patterns principally in demand are those having either shoe or hoe coulters, pressed in by the weight of the machine acting on springs. These give greater penetrative power than the old British pattern, and as the weights which were used to load the coulters are done away with, a lighter and yet a more effective machine is produced. Seeding by the drill in preference to broadcasting admits of a saving of from $\frac{3}{4}$ to 1 bushel of wheat, and from 1 to $1\frac{1}{2}$ bushels of barley or oats, per acre on any but the firmest and best ploughed lands, without any reduction in the thickness of the crop.

The extra labour involved in sowing with the drill, over

machine- or hand-broadcasting, is neither so great, nor so slow, as at first sight it appears. With any of the best patterns of British, Canadian, or American drills, in fields of 10 acres or more, a man and a pair of horses need have no difficulty in seeding an acre per hour. If the coulters are inclined to gather weeds, or clog in any way, an extra person must be employed to keep them clean, but unless someone is wanted for that purpose, the man in charge of the horses can easily do all himself. When at work the driver should sit on the drill, as he has thereby more control of his horses and machine. The passage of the drill breaks up the land as much as a single stroke of the harrows, and as it goes at about the same speed, and takes about the same breadth, a single harrowing is saved, while at the same time the seed has been sown.

Losses in Seeding.

As showing the loss and waste, from various causes, which occur more or less by every method of seeding, it may be mentioned that in a bushel of wheat of 63lb. there are about 865,000 single grains, so that in a seeding of three bushels there would be approximately two and a half millions. It is a very small ear of wheat which has not eight or more rows of grains on each side, while each row may contain from two to four grains. Taking the minimum of rows at eight, and the grains in each row at two, we get 32 grains per stalk. If each grain in the three bushels sown produced only one stalk with an ear of this moderate size, the produce of an acre would be about 96 bushels. It is well known that most wheat plants produce two or more stalks, so that, even on the above very moderate calculation, it is easily seen that immense loss occurs somewhere. Even under the most favourable conditions of farming this loss cannot be eliminated, but it may be considerably reduced by the use of the best seed and the adoption of the most approved methods of seeding.

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THE PURCHASE OF ARTIFICIAL MANURES.

While certain artificial or, as they are sometimes called, chemical or light manures are to some extent applied in autumn, it is in spring that farmers lay in the bulk of their supplies, and therefore it seems appropriate that a few suggestions should be offered at this season in regard to their economic purchase.

There are three substances, and only three, that are valued in artificial manures, namely, nitrogen, phosphates, and potash. According, therefore, to the greater or less quantity of one or other of these substances the value of the manure will rise or fall. Some manures contain only one of these substances—for instance, nitrate of soda and sulphate of ammonia contain only nitrogen; superphosphate, precipitated phosphate, and basic slag contain only phosphate; and kainit, sulphate of potash, and muriate of potash contain only potash—while other manures hold two substances of value, as in the case of bones, which furnish both nitrogen and phosphates, or saltpetre (very seldom used, however, as a manure), which supplies both nitrogen and potash. Only one class of so-called artificial manure, namely, Peruvian or other similar guano, contains an important amount of all three substances.

In price lists **nitrogen** is frequently expressed as ammonia. The relationship between the two substances is, however, a very simple one, and need occasion no difficulty or uncertainty: 17 lbs. of ammonia always contain exactly 14 lbs. of nitrogen, or, what is the same thing from the farmer's point of view, 14 lbs. of nitrogen are the equivalent of 17 lbs. of ammonia. If, therefore, a sample of, say, "corn manure" is offered as containing 4·5 per cent. of ammonia, this is the same as saying that it contains 3·7 per cent. of nitrogen.

Sometimes, though not often, the figure is made to look more attractive by being stated as sulphate of ammonia; but this also need cause no difficulty, if it be remembered that 66 lbs. of this substance are equivalent to no more than 14 lbs. of nitrogen or 17 lbs. of ammonia. If, therefore, we take the above example, the figures mean one and the same thing, whether they are stated as 3·7 per cent. of nitrogen or 4·5 per cent. of ammonia, or 17·4 per cent. of sulphate of ammonia. But a manure merchant who failed to effect many sales for a fertiliser of ever so high-sounding a name on a statement of 1 per cent. of nitrogen or 1·2 per cent. of ammonia might be more successful with a certain class of buyer if he entered the nitrogen as equal to 4·7 per cent. of sulphate of ammonia, and yet the three figures all represent the same fact. Under the Fertilisers and Feeding Stuffs Act, 1893, the invoice must contain the minimum guarantee of nitrogen, stated as such.

Phosphates or **phosphate of lime** may also be entered in an analysis or price list in several ways, but as a rule this ingredient is either stated as above or as phosphoric acid. In an invoice, however, the statement must be made as soluble or insoluble phosphates, as the case may be.

The relationship between phosphates or phosphate of lime, whether soluble or insoluble, and phosphoric acid is quite as simple as that between nitrogen and ammonia: 142 lbs. of phosphoric acid always form 310 lbs. of phosphate of lime, so that to convert the former into the latter one may multiply by 2.2, which, though giving an answer slightly above the truth, is quite accurate enough for all ordinary purposes.

If, therefore, the analysis of a manure is returned as 12 per cent. of phosphoric acid, it is equivalent to saying that it contains fully 26 per cent. of phosphates. Similarly 30 per cent. of phosphates is equal to nearly 14 per cent. of phosphoric acid.

Potash usually exists in manures in the two forms of sulphate of potash and muriate or chloride of potash. It takes 94·2 lbs. of pure potash to form 174·2 lbs. of sulphate of potash, whereas the same amount of potash will form only

149·2 lbs. of the muriate or chloride. In the former case therefore, to convert potash into terms of sulphate of potash we multiply by 1·85, whereas in the latter case we multiply by 1·58. If, therefore, an analysis of, say, kainit is stated as 12·5 per cent. potash, that is equivalent to saying that it holds over 23 per cent. of sulphate of potash; while muriate of potash guaranteed to contain 56·8 per cent. of potash is of about 90 per cent. purity.

Just as a buyer may sometimes be led into purchasing a manure through its nitrogen being expressed as sulphate of ammonia, so may the contents of potash be made to look more attractive by being stated as sulphate of potash. In an invoice, however, the potash must be stated as such.

The rules for approximately converting the various terms into their equivalents may be thus summarised :—

To convert	Nitrogen	into	terms	of	Ammonia	multiply	by	1·2
,,	,,	Nitrogen	,,	,,	,,	Sulph. of Ammonia	,,	,,	4·7
,,	,,	Phosphor. Acid	,,	,,	,,	Phosphates	,,	,,	2·2
,,	,,	Potash	,,	,,	,,	Sulphate of Potash	,,	,,	1·85
,,	,,	Potash	,,	,,	,,	Muriate of Potash	,,	,,	1·58

Nitrogen and phosphates, and, to a less extent, potash, vary in effectiveness, and therefore in value, according to their source or origin. Nitrogen is never so effective as when in the form of nitrate of soda. It is not quite so active, and for some purposes not so valuable, when in the form of sulphate of ammonia, though under certain circumstances this somewhat slower action may be regarded as an advantage. Nitrogen in what is called the organic form is in its least active condition, though here again the rapidity and effectiveness of action vary greatly. Nitrogen is in the organic form in blood meal, fish meal, bones, shoddy, etc., and yet as a source of plant food blood meal is more active than these other substances. It is claimed as an advantage for slow-acting manures that they last longer, which is true; but one applies manures not to last, but to act. It is only where it is convenient to apply manure at somewhat long intervals, as in the treatment of orchards, that the more inert manures are worthy of much consideration.

As regards phosphatic manures, it may be said that while soluble phosphates are all alike active, there is considerable

difference in the value of insoluble phosphates. The insoluble phosphate of bone meal, for instance, is less effective, and for most purposes less valuable, than the insoluble phosphate of basic slag, precipitated phosphate, or even dissolved bones. Some of the insoluble phosphate of the last manure has once been soluble, and has "reverted," and such phosphate is not much less effective than soluble phosphate. But raw bones as a manure have been longer known to British farmers than other forms of phosphate, and for this reason their price has kept relatively high.

THE MORE IMPORTANT MANURES.

Purely Nitrogenous Manures.

The most important are nitrate of soda and sulphate of ammonia, others in general use being rape dust, blood meal, shoddy, etc.

Other things being equal, nitrate of soda is specially suitable :—

(*a*) For use in spring and early summer, as in the manuring of hay, cereals, potatoes and mangolds.

(*b*) For use on heavy land.

(*c*) For use as a top dressing

(*d*) For use in a dry district.

(*e*) For use where immediate effect is desired.

Speaking generally, sulphate of ammonia suits better :—

(*a*) For use on crops that make their growth late in the season ; for example, turnips.

(*b*) For use on light land.

(*c*) For use on soil holding abundance of mild lime.

(*d*) For use where it can be mixed with soil (in contrast to top-dressing).

(*e*) For use in a wet district.

It is, however, often difficult to say for which of these two manures the conditions are most suitable, and then the question should be decided either by the relative cost of the substances, or by using a certain amount of both.

If one of the organic manures can be bought at a cheap

rate it may be used to some extent as an ingredient of a mixture.

Nitrogenous manures cannot be profitably employed on leguminous crops (peas, beans, clover, etc.), and on a mixed crop of, say, clover and grass, if the clover is to be preserved against suppression, they must be used sparingly, if at all. They must also be used with caution on barley, and especially so where a fine sample, rather than large yield, is looked for. Other crops, however, generally respond freely to the use of this class of manure.

Nitrate of soda and sulphate of ammonia are apt to be lumpy, therefore the buyer should look carefully to the mechanical condition. Nothing should be applied that will not pass a ½-inch riddle. Lumps larger than this will often l plants with which they may come into contact.

Nitrate of soda is generally offered on the basis of 95 per cent. of purity (equal to 15·6 per cent. nitrogen or 19 per cent. ammonia), while commercial sulphate of ammonia usually contains 97 per cent. of the pure article (equal to 20·6 per cent. nitrogen or 25 per cent. ammonia). Sulphate of ammonia is thus the much more highly concentrated manure.

Purely Phosphatic Manures.

Of these superphosphate and basic slag are the most important. The former is, speaking generally, more suitable for use under the following circumstances:—

(*a*) Where rapid effect is wanted.
(*b*) In spring.
(*c*) For arable land.
(*d*) For admixture with sulphate of ammonia.

Basic slag is specially suitable:—

(*a*) For use in autumn.
(*b*) For use on grass land.
(*c*) For use on land holding much peat or other vegetable matter.
(*d*) For use on land addicted to finger and toe.
(*e*) For use in orchards.
(*f*) For admixture with nitrate of soda.

Basic slag generally leaves little to be desired as regards mechanical condition, provided the grinding be fine enough (80 per cent. through a No. 100 sieve should be the minimum requirement). Superphosphate is sometimes almost as dry and mealy as slag, but in other cases it is lumpy and sticky. Samples of the latter character are of reduced value, and should be avoided.

Superphosphate is of varying degrees of quality, the usual contents being 28 to 30 per cent. of soluble phosphate. Basic slag also varies in quality, the usual contents being 35 to 40 per cent. of insoluble phosphate.

Phosphatic manures are of special value in the manuring of turnips, leguminous crops, hay and pasture. They are of less importance for potatoes and mangolds, and least of all for cereals. In the case of the last class of crops it usually happens that the plants are able to satisfy their requirements from the natural supplies in the soil, or from residues of former applications. Whether, on any particular farm, it will pay to apply a direct phosphatic dressing to a corn crop can only be determined with certainty by means of a simple field experiment.

Nitrogenous-Phosphatic Manures.

The most important of these is dissolved bones, though bone meal, fish meal, etc., have their value for certain purposes.

Dissolved bones lose in value through being damp and lumpy; they can, however, be bought as dry and almost as fine as superphosphate. They usually contain 32 to 34 per cent. of total phosphates (of which more than half should be soluble), and fully 3 per cent. of nitrogen. Bone meal should be very fine and free from grease. Any particles $\frac{1}{10}$ of an inch or upwards in size become available very slowly. It should hold about 50 per cent. of phosphates and 4 per cent. of nitrogen.

Potash Manures.

Genuine Kainit contains about 12¼ per cent. potash, besides which it holds over 30 per cent. of common salt.

Where, therefore, a farmer wants to use the latter substance, he may find it to his advantage to employ this manure.

Sulphate of potash is offered in various degrees of strength, containing from 25 to over 40 per cent. of potash. Muriate or chloride of potash often holds over 50 per cent. of potash.

All potash manures are apt to be lumpy, and if they are stored long they may become so hard as to be almost unmanageable. Poor mechanical condition is here quite as undesirable as in the case of other manures.

Potash manures are most important for root and leguminous crops, less so for grass and cereals. There are many well-authenticated instances of potash manures doing positive harm to meadows, though in other cases they have been used effectively. Whether they are wanted on any particular farm or not can only be determined by experiment.

VALUATION OF ARTIFICIAL MANURES.

There are various methods of valuing artificial manures, of which that known as valuation by units is most employed by farmers and dealers. The general trend of prices is determined by market influences, and is largely beyond the farmer's control, but a reliable method of valuation enables him quickly and accurately to conclude which of several samples of the same class of manure is the cheapest.

For the purposes of the valuation of artificial manures, a unit may be taken as synonymous with 1 per cent. of the valuable substance in a manure. To find the value of a unit we divide the price of a ton by the percentage composition of the manure. Thus **sulphate of ammonia** containing 20 per cent. nitrogen, and costing £11 per ton, carriage paid, offers nitrogen at £$\frac{11}{20}$ = 11s. per unit. Or as 20 per cent. of nitrogen is equivalent to about 24¼ per cent. of ammonia, the cost of a unit of ammonia is 9s. 1d. We can use one or other of these unit-values to enable us to determine which of several samples of sulphate of ammonia is the cheapest. Suppose that we are offered two other samples, the one guaranteed 18½ per cent., and the other 16 per cent. of nitrogen; the price per ton of the former, on the same

basis, should be $18\frac{1}{2} \times 11s. = £10$ 3s. 6d., while that of the latter should be $16 \times 11s. = £8$ 16s. Comparing these figures with the price actually demanded, we are able at once to determine which of three lots of manure is the cheapest.

It may be mentioned that it would be rather exceptional to have the opportunity of obtaining sulphate of ammonia so poor in nitrogen as 16-18 per cent., but dirty samples do sometimes occur, and if the quotation of a price, to include carriage, can be obtained, one can sometimes secure good value in a low-class manure, provided the impurities are of a perfectly harmless character.

The value of a unit of nitrogen in nitrate of soda is generally rather higher than it is in sulphate of ammonia, which means that farmers regard the former source of nitrogen as rather the more valuable.

When sulphate of ammonia is selling at about £11 per ton, carriage paid, **nitrate of soda** will usually be costing about £9. On a basis of $15\frac{1}{2}$ per cent. of nitrogen the value of a unit in the latter case works out at $\frac{£9}{15 \cdot 5} = 11s. 9d.$, that is 9d. higher than in the case of sulphate of ammonia. If we use this unit to value sulphate of ammonia we should get the value of a ton as $20 \times 11s. 9d. = £11$ 15s., which is 15s. higher than this manure can usually be bought for when nitrate of soda is at £9 per ton. Now, it lies in the power of many farmers to secure this 15s. by depending on sulphate of ammonia rather than nitrate of soda where the conditions are specially suitable for the use of the former substance. When sulphate of ammonia costs more, per unit of nitrogen, than nitrate of soda, as occasionally happens, the latter manure is almost invariably to be preferred.

As a rule organic nitrogenous manures are priced in the market at a much higher rate per unit than in the case with the two manures just looked at. The results of their use do not justify this position, for organic nitrogen will not produce so much increase as nitrogen from nitrate of soda or sulphate of ammonia. If we employ 11s. 9d. as the value of a unit of nitrogen in its most effective form, and apply it to the valuation of some organic manures, we should get some such results as these :—

Fish Meal, say 8 per cent. of nitrogen × 11s. 9d. = £4 14s., together with an allowance of about £1 for phosphates, giving a total value of £5 14s. per ton. Some samples of fish meal hold more and some less than 8 per cent. of nitrogen, in which case the value would rise or fall, though not quite proportionately, on account of the phosphates.

Blood Meal, say 12 per cent. of nitrogen × 11s. 9d. = £7 1s., together with about 5s. on account of a little phosphate.

Rape Meal, say 5 per cent. of nitrogen × 11s. 9d. = £2 18s. 9d. per ton.

The values per ton for these three manures are considerably higher than the merits of the manures would warrant. These manures, in fact, are only worthy of a farmer's attention, under ordinary circumstances, when they can be bought at a rate per unit of nitrogen that is considerably less than that which applies to nitrate of soda or sulphate of ammonia.

Phosphatic manures are also valued in the same way. At the present time the insoluble phosphates in **basic slag** are valued at about 1s. 3d. per unit, and at this rate a sample containing 40 per cent. may be put at 40 × 1s. 3d. = £2 10s. per ton, carriage paid, while a 30 per cent. sample is no better value at 37s. 6d. As a rule the lower grades cost more per unit than the higher qualities, so that the latter are usually the better value.

The soluble phosphate of **superphosphate** may at present be valued at about 1s. 9d. per unit. At this rate a 28 per cent. sample would cost £2 9s. per ton, carriage paid, while a 34 per cent. sample would be as good value at £2 19s. 6d.

In **bone meal**—which should only be bought when very finely ground, really dust—the nitrogen is usually valued at about the same rate as that in sulphate of ammonia, while the phosphate may be put at the same rate as that which prevails for basic slag. On this basis a sample containing 4 per cent. nitrogen and 50 per cent. insoluble phosphates would work out as follows, though it can often be bought for less:

4 × 11s. 0d. - -	= £2	4	0	
50 × 1s. 3d. - -	= 3	2	6	
Total - -	£5	6	6	per ton, carriage paid.

In **dissolved bones** the market rate for nitrogen may be put at that which prevails for nitrate of soda, while the rate for the insoluble phosphate is usually the same as that in bone meal. The soluble phosphate in this manure is exactly the same substance, chemically, as that in superphosphate, and yet it is generally valued about 1s. per unit higher. The only justification for this would appear to lie in the fact that the insoluble phosphate, being partly reverted, should be valued somewhat higher than that in raw bone, and raising the rate for the soluble phosphate makes some allowance for this.

Taking these figures, and assuming a good sample of dissolved bones, we come to the following result:

3 per cent. Nitrogen -	× 11s. 9d. =	£1	15	3	
20 per cent. Soluble Phosphates	× 2s. 9d. =	2	15	0	
16 per cent. Insol. Phosphates	× 1s. 3d. =	1	0	0	
Total - -		£5	10	3	per ton, carriage paid.

Although this is about the market rate for dissolved bones, it would appear to be higher than their intrinsic merit warrants.

Kainit can usually be bought at the rate of 4s. per unit of potash, so that, on an analysis of $12\frac{1}{4}$ per cent. of potash, the price of a ton, carriage paid, would be $12\frac{1}{4} \times 4s. = £2\ 9s.$

Sulphate of Potash, containing 25 per cent. of potash (corresponding to a purity of about 46 per cent.), would, at the same rate, be worth

25 × 4s. 0d. - - = £5 0 0

while high-class manure, containing, say, 40 per cent. of potash (corresponding to a purity of about 74 per cent.), would be worth

40 × 4s. 0d. - - = £8 0 0

In point of fact, it is generally found that in the higher grades of sulphate of potash the unit value of potash is

somewhat higher than that in kainit; so that with kainit at £2 9s. per ton, the market value of sulphate of potash of a purity of 74 per cent. is likely to be about

40 × 4s. 3d. - - = £8 10 0

With a light haulage, and specially if the manure can be applied in autumn or early spring—so as to admit of certain undesirable magnesia salts being washed out—kainit is usually the preferable manure; but for use at seed-time, and especially when mixed with other manures, sulphate of potash has advantages.

Muriate of potash is usually placed on purity of 80 to 90 per cent., corresponding to 50 to 57 per cent. of potash. Taking the former quality, and adopting the unit value of potash in kainit, the price of a ton would work out at

50 × 4s. 0d. - - = £10 0 0

Generally a unit of potash in muriate is valued at a lower rate than that in kainit or sulphate of potash, so that the market quotation per ton is likely to be about

50 × 3s. 9d. - - = £9 7 6

Muriate of potash, in fact, usually offers the cheapest supply of potash, and for most crops it is probably as effective as any potash manure, while for potatoes it would seem to be superior.

The most important example of a manure holding nitrogen, phosphates, and potash is **Peruvian and similar guano.** The composition varies within wide limits, but the following may be taken as an example:

Nitrogen	12 per cent.	× 11s. 9d.	=	£7	1	0
Sol. Phosphates	5 per cent.	× 1s. 9d.	=	0	8	9
Insol. Phosphates	15 per cent.	× 1s. 3d.	=	0	18	9
Potash	2 per cent.	× 4s. 0d.	=	0	8	0
	Total	- -		£8	16	6

Such a manure, however, would probably be priced at a much higher rate; so that guano, like bones, would appear to be still under the influence of past traditions.

The above figures must be regarded merely as examples, prices fluctuating considerably from year to year, and in different parts of the country, owing to a variety of causes.

It may be pointed out that the purchase of manures at a certain rate per unit, subject to analysis by an approved chemist, makes a farmer largely independent of variations in quality. If, for instance, he agrees to pay 1s. 3d. per unit, carriage paid, for phosphates in basic slag, it is a matter of comparative indifference to him whether the consignment proves to be of 35 or 40 per cent. quality. In the former case the price of a ton would be 35 × 1s. 3d. = £2 3s. 9d., while in the latter case it would be 40 × 1s. 3d. = £2 10s. Needless to say, he would not apply the manure to his land till he was in possession of the analysis, and then he would regulate the dressing with some regard to the quality of the material.

INVESTIGATIONS UPON THE GROWTH OF HOPS, 1895-1901.

The hop crop forms one of the most important branches of the agriculture of Kent and Surrey, although of late years the acreage has been shrinking. There were, in 1900, 31,514 acres under hops in Kent and 1,300 in Surrey, and when one considers the expenditure upon, and the value of, the crop, the importance of the industry is still more manifest. In the most highly farmed gardens of East and Mid-Kent the expenditure reaches, and in many seasons exceeds, £50 per acre, before the grower finally receives his annual return, some two-thirds of this amount being paid away for labour. Even on the poorest grounds in the Weald the annual outlay cannot be set at less than £25 per acre. It is difficult to put down any average figure for the value of the crop, because the gross yield is subject to fluctuations which cannot be paralleled among ordinary field crops, and the price varies from year to year even more widely than the crop. Modern improvements in meeting the attacks of disease prevent that wholesale destruction of the crop which used to occur within the experience of living growers; but even the past four seasons have seen a rise and fall of cent. per cent. in the yield and the monetary return: of yield from 10 cwt. to 20 cwt. per acre, and back again, the price fluctuating inversely between £8 and £2 per cwt.

At present, on the best lands, hops are without doubt the most highly farmed and most skilfully-managed crop in the world. Whether we regard the care and labour expended in training, the thoroughness of the manuring and cultivation, the systematic manner in which the two recurring attacks of insects and fungoid disease are met, no other agricultural industry shows quite the same development of technical

skill. This intensive cultivation of the hop crop is a comparatively modern affair; the description of the management of hops contained in Scot's "Perfite Platform of a Hoppe Garden" (1573), would have been generally applicable thirty years ago, and holds to-day for many of the poorer farms in the backward districts. The great changes, such as the replacement of the old poles by structures of wire and string, the employment of artificial manures, the use of sulphur to combat mould, and of soft soap washes to deal with green fly or "blight," have grown up within the experience of the present generation of hop growers. The result of these changes has been that the average crop per acre has risen; during the earlier part of last century the average crop from decade to decade showed little variation, being about 6 cwt. of hops per acre; this had become 9 cwt. per acre for the decade 1880-90. Another result has been the shrinkage of the acreage under hops towards certain well-defined centres, where soil and climate are perhaps more favourable, and where neighbourhood and intercourse seem to raise the standard of management. In a Return for 1844 we find hops grown in places like Cornwall, the Isle of Wight, Lincoln, Cambridge, Northampton, Essex; nowadays these outlying districts have grubbed their hops. With the exception of four acres in Suffolk, which make an occasional appearance in the Returns, the crop is confined to certain districts—the great Kentish garden, which lies along a line drawn from Tonbridge through Maidstone to Rochester and Canterbury; the Wealden area, which includes Sussex and part of Kent; the Farnham-Petersfield district; and the great West Midland plantation, consisting of parts of Worcester and Hereford, with offshoots into Gloucester and Shropshire. Even in the favoured counties the tendency is seen to draw in towards certain centres; in the Medway Valley, the Tame Valley, the group of parishes round Sittingbourne and Faversham, more hops are being planted, though the total acreage in the county may be decreasing.

In view of the importance of this crop and the many applications of science involved in so intensive a culture, the South-Eastern Agricultural College was naturally drawn into

investigations on various points connected with the growth of hops, and as these investigations have been in progress since the season of 1895, it may not be out of place to summarise the results which have so far been reached. The investigations have been of a varied nature: in one direction they deal with the methods of cultivation and management of the plant; in another with the manuring, particularly in relation to the different soils upon which hops are grown; thirdly, the conditions affecting the drying process, to which the hops are subjected after picking, have been worked at; and lastly the insect pests and other diseases have occupied much attention. The field trials have been carried on at Wye in a small hop garden planted on the College Farm, and at various places in Kent and Surrey, on land placed at the disposal of the College by the occupiers.

In the work many members of the staff of the College have co-operated. Professor J. Percival has for some years had the actual superintendence of the field trials, other than those at Wye, taking up this work when Mr. H. J. Monson left Wye; his, also, is the botanical work; Mr. F. V. Theobald is responsible for the entomological work; and Mr. H. H. Cousins, before he went to Jamaica with Mr. F. T. Holbrook, did much laboratory work on the question of Hop Resins, as well as field work on the prevention of disease.

The plots in the field trials vary in area from half an acre down to one twelfth of an acre; the crop is always weighed in a green state as picked. In the following tables the results each year are recalculated to a common standard, one plot being always taken as 100. In this way the results are easier to follow, because the fluctuation of the crop from year to year is eliminated; for the actual weights per acre the Journal of the South-Eastern Agricultural College should be consulted.

The hop is a perennial plant, dying down to ground level every year; on good soils it is to all intents permanent, although perhaps 2 or 3 per cent. of the stocks die and are renewed each season. Gardens 30 to 50 years old are not uncommon, whereas on cold or stiff soils a garden may need grubbing after ten years' cropping. Each plant forms what

is termed a hill (two or three individual stocks may be planted to form one hill). Some form of rectangular planting is always adopted, the number of hills per acre varying between 700 and 1,700. The gangways along which cultivation proceeds are known as "alleys"; their width may be anything from 6 to 10 feet. Formerly the hop grew up a pole; two or three poles, commonly of sweet chestnut, and 14 to 18 feet long, creosoted at the base, were set to each hill. Poles are still common, especially in the Weald and in the Farnham district, but they are giving place to permanent structures of wire strained on stout posts; to the wires are laced each year "strings" of coir yarn about $\frac{1}{4}$ inch in diameter, and with a breaking strain of about 50 lbs., up which the hopbine twines. The College hop garden at Wye was laid out to test the comparative value of the old poling system and of the different methods of arranging the wires and string.

Poles v. String.

The following table shows the comparative crop on the plot poled with two poles to the hill, as against the average on all the other plots in the same garden where the hops were grown upon string and wire:—

Year.	Average crop upon string.	Crop on poles.
1897	100	90
1898	100	77

The collateral advantages of growing hops upon string, their greater health, and the ease with which they can be "washed" to free them from mould or green fly, seemed to render the further testing of the growth upon poles a work of supererogation. The poles were therefore discontinued, though one point connected with their use was the subject of further investigation.

When hops are grown upon poles it is necessary to sever the bine from the rootstock when the pole is pulled up in order to pick the hops. At this time the bine and leaves are still green, and presumably contain nutrient material—nitrogen, phosphoric acid, and potash—which would be withdrawn into the permanent rootstock if the plant were allowed

to ripen and die off in a natural way. It was noticed that where the bine had been cut at the preceding picking time, the early growth was weaker than on the other plots, where the hops were picked off bines which are left attached to the rootstock till they are quite "dead," in October or November. Detailed analyses were made of the green bine and leaves at picking time, and later of the corresponding dead stuff; the results confirmed the idea that there is a return of material to the root of the hop. The following table shows the amount of these nutrient materials in the hop plant, calculated as lbs. per acre for an average crop, and apportioned between the hops themselves which are sold, the dead bine and leaves which are removed, and that which was present in the green bine and leaves at picking time, but which returns to the root later, if the bine be not cut.

Constituents of hop crop, lbs. per acre:—

	In Hops.	Dead Bine and Leaves.	Returned to Root.	Total.
Nitrogen - - - -	50·5	17·5	20·6	88·6
Phosphoric Acid - -	15·7	4·8	4·8	25·3
Potash - - - - -	39·0	4·4	26·1	69·5
Lime - - - - -	16·2	88·1	4·2	108·5

The effect on the succeeding crop of the loss to the stock caused by cutting away the bine at picking time, was studied by observing the later crops upon the plot which had been poled, and was converted into string work after 1898. The weakening effect was noticed in the succeeding crops for two seasons, as shown in the table below:—

Year.	Mode of Training.	Treatment Previous Harvest.	Comparative Crop on Plot.	Average of otherStringed Plots.
1897 - -	Poles	Not cut.	90	100
1898 - -	Poles	Cut	77	100
1899 - -	String	Cut	84	100
1900 - -	String	Not cut.	93	100
1901 - -	String	Not cut.	102	100

To the many disadvantages inherent in the old plan of growing hops upon poles, such as their uneven ripening and

the difficulty of washing, must be added the weakening and subsequent loss of crop due to the inevitable cutting of the bine when the hops are picked.

Systems of Stringing.

The greater part of the experimental garden at Wye is given up to a test of the comparative value of the different arrangements of wire and string, up which the hop bine is trained. The plots are approximately half an acre each in area, and the systems represented are those known as Butcher's, which is general throughout East and common in Mid-Kent; the Umbrella, generally seen in Mid-Kent; and a modification of the system used in Worcester and Hereford, which has also been somewhat taken up in the Weald.

In Butcher's system three strings start from the hill, up each of which two bines are led; the strings rise vertically to a breast wire 4 ft. 6 in. from the ground, then they are taken on the slope to the top wire, which is above the next row of hills at a height of 12 ft. 6 in. In the Wye garden the upward slope is towards the north, so that the strong winds from the south and south-west strike on the face of the slope. Six of the plots in the Wye garden are planted in this fashion, but with varying distances between the hills and the alleys. The width of the alleys affects not only the number of hills to the acre, but also the angle of the sloping string, for, as the height of the top wire is invariable, the broader the alley the flatter the slope of the string will become. The hop plant grows most freely as the slope of the string approaches the vertical; the bine climbs with difficulty when the angle is 45 degs., and must be trained by hand for still lower angles. This means a considerable expense for labour when the alleys are wide and the slope flat. On the other hand, the flat slope induces a greater fruitfulness, and causes the lower laterals to throw hops more freely, so that the smaller number of hills per acre is compensated by the greater yield per hill. When the alleys are wider and the number of hills per acre are less the cultivation is a little easier and not so expensive, because many of the operations of the hop garden are paid for per 100 hills rather than per acre.

Another advantage of the wider alleys and of wide spacing between the hills comes from the greater exposure of the growing bine and hops to sun and air; the result is that the hops become harder, better developed, and in consequence more resistant to blight and mould; there are not so many of the soft green half grown hops that are to be seen in a crowded garden.

As far as can be seen from the plots at Wye, where the alleys vary from 10 ft. to 6 ft. in width, and the hills from 700 to 1,200 per acre, there is not much difference in yield, taking the mean of several years; on the whole, the more widely planted plots have given the larger crops, except in very short seasons like 1900, when the more closely planted plots had an advantage.

Our general impression is that the 8 ft. square plant has given the best results, if we take into account the quality of the hops grown on this system, and their freedom from disease, as well as the gross weight per acre. The plot with alleys 10 ft. wide, though growing very fine hops, costs too much for training up the flat string.

In the so-called umbrella system there is a pole to each hill, but the lines are trained to four strings, which run up from the hills north, south, east, and west, to permanent wires at the 12 foot 6 inch level, until the whole arrangement somewhat resembles the frame of an umbrella with four ribs only, stuck into the ground handle downwards. The strings from adjoining hills to a certain extent cross one another, though actual contact is avoided. Seen from above when the plant is fully grown the system seems to form a series of four sided cups, up the centre of each of which comes a pole. In the Worcester system the hills are set more closely together, the alleys are seven or eight feet wide, but in the rows the individual plants are only from 3 feet to 3 feet 6 inches apart, thus giving about twice as many hills per acre as in the Kentish systems. From each hill two strings are led at an angle with the rectangular plan of the garden to overhead wires running either above the centre of the alley or above the adjoining row of hills. The result is a series of interlacing strings, which are never in contact,

but divide up the available air space in a very ingenious fashion.

As regards the comparative merits of the different systems—Butcher, Umbrella, and Worcester—the Umbrella in 1901 maintained the leading position it has had for the previous two seasons, giving the heaviest crop of any of the plots. The disadvantage of this system lies in the difficulty of washing properly, the interlacing strings shield one another from the stream of wash, and when there is much bine it is almost impossible to get any spray on to the top. In the matter of washing the Butcher system is the most easily cleansed, because all the bines are in one plane, and the jets can be arranged to thoroughly cover this area as the washer moves along. The Umbrella system is also more liable to wind bruise than the Butcher; the wind gets under the bines more easily, and the whole structure chafes and sways, because it is without the stiffening which the breast wire gives in the Butcher system. The Worcester system gave in 1901 a crop rather above the general average of the garden, whereas for the two previous seasons the crop on this plot was lower. This effect is not so much due to the system itself as to the practice of cutting the bines at the stock when picking, which is usually followed when hops are grown on this system, because there is no convenient breast wire over which the bines can be thrown. Accordingly in 1900 care was taken not to cut the bines on this plot, with the result that the crop has returned to or even exceeded the average of the garden.

Systems of Training, 1897-1901.

System.	Width of Alleys.	Hills Apart.	Hills per Acre.	Average Crop = 100.				
				1897.	1898.	1899.	1900.	1901
Butcher's - - - - -	10	5	870	77	116	93	92	91
Butcher's - - - - -	8	8	640	112	85*	107	83	100
Butcher's - - - - -	7	7	890	112	114	106	104	90
Butcher's - - - - -	7	6	1,037	106	97	105	112	101
Butcher's - - - - -	6½	7½	1,031	—	—	99	109	100
Butcher's (three strings to pole) - - - - -	6	6	1,210	—	—	84	93	101
Umbrella - - - - -	6	6	1,210	96	91	111	124	111
Worcester - - - - -	7½	3¼	1,786	94	99	94	85	106
Average crop—cwts. - - - -				12·7	11·9	20·1	10·4	20·9

* Crop reduced by accident.

The Worcester system, having 1,700 hills to the acre, is somewhat more expensive to cultivate; it also possesses the disadvantages of the Umbrella work in want of stiffness against wind, and in the difficulty of washing it thoroughly.

The net result of the five years' trials seems to be that no one system of training hops can be definitely said to be "the best"; different seasons favour different plans; a free-growing variety on a rich soil will require to be more widely spaced, and trained on a flatter slope than would yield the best results in a less vigorous garden. Nor is the problem only one of the maximum production; the cost of cultivation and training must be considered. Some gardens are sheltered, and much account need not be taken of the stiffness against wind of the system adopted; others again are specially liable to attacks of aphis, and must be designed to admit of easy and thorough washing. The adoption of any particular system and method of planting, becomes a matter of judgment, of balancing the relative advantages and disadvantages possessed by the various plans, in the light of what is known of the particular soil and situation. Our general judgment is in favour of the Butcher system, more widely spaced than usual, so as to admit the maximum of air and sun to the bines. The shorter crop, which will sometimes result from the wide planting will be more than compensated by the superior healthiness and better quality of the product.

The Effect of "Stripping."

It is the prevailing practice among the better cultivators of hops to strip away the leaves and the lateral shoots from the bine to the height of 4 or 5 feet, about the first week in July. Women are sent through the garden, and with a sharp pluck upwards tear away the green leaves on either side the bine, together with the lateral shoot which starts from the axil of the leaf. Sheep are occasionally turned in to eat this lower growth away and save labour; sometimes it is cut away with a billhook, but the risk of a casual slash through the bine itself is too great. The justification of this stripping process lies in the difficulty of getting any spraying machine to deal adequately with the lower foliage; in certain conditions of weather the aphis hangs about the lower part of

the plant, and will spread thence and ruin the crop if not dealt with. The "mould" or hop mildew, the other great scourge of the plant, is very likely to begin among the shaded, and therefore soft, lower growth, for the spores hibernate in the ground, and thence take their rise. Another result of the stripping is the admittance of more sun and the freer circulation of air at ground level, thus in showery seasons a better tilth can be maintained, and there is less danger of mould.

With all these advantages it appeared probable that on occasion the plant received a serious check from stripping; the removal of so large a proportion of the active leaf surface, busily engaged at the time in drawing nutrition from the atmosphere, might so check the development that a loss of crop would follow. To test this question, certain portions of the Wye garden have been stripped as usual for the last four seasons, unstripped areas being left alongside for comparison, and the hops on each portion separately weighed at harvest. The character of the past four seasons has been such as to give this experiment a very convincing trial; there have been two seasons of scanty growth, 1898 and 1900, yielding little more than half the crop attained in the following big years, 1899 and 1901. It was found that in the years of vigorous development, when the big crops were grown, the stripping caused no loss of crop, for the plant grew away without being affected by the operation. In the short years, however, the stripping caused a loss of crop, for the plant was unable to recover from the check it had received. The following table shows the comparative crop on the stripped and unstripped plots, the average crop yielded by the garden in each year being also appended. There was no measurable

Year.	Date of Stripping.	Unstripped.	Stripped.	Average Crop.
				Cwts. per acre.
1898	July 5th	100	93	11·9
1899	June 24th	100	100	20·1
1900	July 3rd	100	77	10·4
1901	June 25th	100	100	20·9

difference between the plots in 1899 and 1901, when the crop was over a ton per acre; there was a loss on the stripped plot

of 7 per cent. in 1898 with a crop of 11·9 cwt. per acre, and of 23 per cent. in 1900, when the crop fell to 10·4 cwt. per acre. The practical deduction is that in seasons when the bine is not growing freely stripping should be deferred, or done by degrees instead of in one operation.

Experiments on the Depth and Amount of Cultivation.

Considerable diversity of practice exists in the amount of cultivation given and the depth to which it is carried. In East Kent, where the typical hop soils are deep free working loams, and where the climate is generally of the driest, it is customary to work the soils very thoroughly the whole season. The steam "shim" is often put through to stir the soil down to a depth of 10 inches as soon as the land can be worked, and though the depth may be diminished, the labour is continued up to harvest time at 6 inches or so. In other districts the cultivation is always shallower, and even reduced after June to merely keeping the surface alive and destroying the weeds. To test some of these points certain plots were laid out in a small hop garden at Goudhurst, where the soil was a deep sandy loam. The results have been somewhat astonishing, for the discontinuance of all cultivation beyond the destruction of the weeds, for seven successive years has resulted in no particular falling off in crop, though perhaps a slight inferiority in the quality of the product may be seen. This is the more unexpected, as the seasons have been uniformly hot and dry, when the reserves of moisture in the soil must have been drawn upon to the utmost. So palpable has been the result that the owner of the garden has now ceased to cultivate the whole of it and others; this example is, to a certain extent, being copied in the district. The other notable result in this cultivation experiment is that a deep cultivation, just when the hops are beginning to form, induces an earlier ripening of the crop. Probably the destruction of surface roots checks the vegetative development of the plant, and the ripening process begins earlier.

The results obtained at this centre are of such importance, and have been so consistent for the whole period, and also when extended to a greater area than the original plots, that they must be tested on other soils and situations.

A. D. HALL.

THE CULTIVATION OF MAIZE FOR FODDER.

This crop has been grown on a small scale in certain parts of England for many years, but the dry summers of the past decade and the reports of the success of the crop in Canada and the United States, have been the means of securing for it from British farmers a largely increased amount of attention.

Maize, when grown for fodder, does not demand a better climate than many districts of England are able to offer, while as regards soil-requirements and expenses of cultivation it compares favourably with most of our common fodder crops.

Taking an average of seasons, it is doubtful if the cultivation of maize is likely to prove of advantage north of the English Midlands. In the Southern and South-Eastern Counties, however, where a low rainfall and frequently recurring periods of drought make the growth of roots rather uncertain, maize offers the opportunity of securing a large bulk of succulent material that may to a considerable extent replace the common fodder crops.

While this crop may be grown on a variety of soils (sand, clay, and fenland), it is found to give its best return on a mild, deep loam. The land should be ploughed early, so as to secure a good tilth, and in spring the ground should be cleaned and generally prepared as for roots. Ten or twelve tons of farmyard manure per acre, supplemented, when the crop is above ground, by 1-2 cwt. of nitrate of soda, would be sufficient manuring. Where the natural fertiliser is not available, artificials may be resorted to, a suitable mixture consisting of 1 cwt. sulphate of ammonia, 2-3 cwt. superphosphate, and a similar amount of kainit on light land. The seed may be sown from the middle of May till the middle of June, though the young plants run

considerable risk of injury from frost in the case of May sowings. In America there are varieties of maize specially adapted for fodder purposes, and probably some of these are well adapted to English conditions. But results considered sufficiently satisfactory are got in this country from the use of the ordinary flat white maize that is sold for feeding purposes, provided care be taken to ascertain by experiment that its germinative capacity is satisfactory, say 90 per cent. or upwards. It is of the utmost importance that such a test should be carried out, as, owing to heating, much commercial maize is incapable of germination.

The seed may be sown in a variety of ways, *e.g.*, by hand dibbling, by means of a bean drill, etc., the best results being attained by placing the rows not closer than 16 inches, and by burying the seed to a depth of about 2½ to 3 inches. The quantity of seed varies between 1½ and 2½ bushels per acre. Heavy rolling after sowing is recommended by several of the best growers. The greatest trouble, in many cases, arises from the attacks of rooks, which search for the sprouting grain with great persistency. It is, therefore, absolutely necessary that means be taken to keep these birds off, and this is best done by "stringing" the field before the sowers leave it. If this operation be delayed, and the rooks find out that maize is in the ground, it is extremely difficult subsequently to keep them off. Tarring the seed before sowing is also practised with fair success as a method of prevention.

When the young plants appear horse and hand hoeing must be attended to, as in the case of other drilled crops; but when once fairly established maize, being a rank-growing plant reaching a height of 5 or 6 feet, will largely suppress weeds.

The crop may be utilised in several ways. It is found to be very useful for scattering on bare pastures in August and September, where it is readily eaten by all kinds of stock, not excluding pigs. In America, and to some extent in this country, the main value of the crop is due to the opportunity it provides, through the agency of ensilage, of furnishing a supply of nutritious succulent material for use in the winter and spring months.

The quality of the silage that maize produces is excelled by that of no other crop. If maize be utilised in this way it should stand till it is as mature as it is likely to become in this country, though it must be got off the fields before the occurrence of autumn frosts. Generally speaking the latter half of September is the best time to make maize silage, which may be produced in stacks, draw-heaps, silos, pits, etc. (For general information in regard to ensilage, see Leaflet No. 9.*) The practice of several farmers is to utilise as much of the crop as possible in a green condition, and about the middle of September to make what remains into silage. In order to admit of the completion of the fermentative changes it is desirable not to feed maize silage to stock till well into spring. At that time a good sample is of a brownish green colour, and emits an aroma almost indistinguishable from that of strong tobacco. It is much relished by stock, and seems to have a feeding value superior to that of mangolds.

* Copies of the leaflet may be obtained, post free and free of charge, on application to the Secretary, Board of Agriculture, 4, Whitehall Place, S.W.

POULTRY MANAGEMENT ON A FARM.

Considerable attention has recently been directed to the desirability and possibility of the extension of poultry-keeping as an adjunct to the ordinary operations of the farm. The Board have received at various times reports and circulars issued by the National Poultry Organisation Society, which was established in 1899, and has now assumed considerable importance, with a membership of over 2,000, and with 27 branches and centres, and 18 collecting depots. Started with the main object of developing the commercial side of the poultry industry by systematising the collection and distribution of eggs, the society, without itself engaging in trade, appears already to have made some progress in stimulating the local organisation of producers, and in advocating improved methods of poultry management.

In this connection the Board have received a copy of a small book entitled "Poultry Management on a Farm," in which Mr. Walter Palmer, M.P., an active member of the Executive Committee of the National Poultry Organisation Society, gives a detailed account of the system of poultry-keeping adopted on two of his farms at Winkfield, Berkshire, comprising altogether about 220 acres. The soil throughout is a fairly stiff clay, and the land is mostly in grass, but with arable fields conveniently near the homestead. As new buildings have been erected for the cattle and horses, the old wooden buildings (more than 200 years old) have been utilised for the various purposes connected with poultry. The management of the farm is entrusted to Mr. G. E. Parham, who obtained his diploma of agriculture at Reading College, where he also went through a regular course in aviculture.

"Poultry, like cattle," says Mr. Palmer, "must be more or less selected in accordance with soil," and consequently he experimented with about twenty varieties before he was satisfied which was best suited to his circumstances. Eventually he selected for table birds Indian Game crossed with Buff Orpington, and, for general purposes and egg production, Brown Leghorn crossed with Buff Orpington. Each of these breeds has consequently to be maintained pure for stock, and in order to meet demands for sittings of eggs, a certain number of pure-bred Plymouth Rocks, Faverolles, Minorcas, Golden Wyandottes and Anconas are also kept.

The question of labour is obviously important, and Mr. Palmer refers to the difficulty experienced in finding capable men—a difficulty which he thinks will be partly overcome by the efforts of County Councils to teach poultry management. In his case the poultryman is assisted by another man, who devotes the whole of his time to feeding and to general work, and a boy also assists on Sundays and after school hours. The plucking is done by the poultryman's wife. The maximum number of fowls is reached in July, after which, until November, the stock is diminished as table birds are killed. In July, 1901, the total number was 2,700, the attendance on which, with the making of houses, coops, and appliances, fully occupied the present staff.

After a description of the houses and appliances used, the general arrangement of the poultry is detailed. Hatching commences at the end of October, so as to provide spring chickens for March and April. Incubators and foster-mothers are used during the winter, but in the spring and summer hens are preferred. Hens are sold off in August and September at two and a half years old, and realise about 1s. 6d. each. Chickens hatched in the autumn and early spring are placed in the chicken-rearing shed, and when two to three months old are removed to some warm house in a dry, sheltered spot facing south, to which is attached a covered run. When young chickens are thus moved a foster-mother is placed inside the house; but for older chickens a lantern suspended in the house provides any additional warmth that may be necessary. In March the chickens, when

hatched, are placed direct in the fields, in either foster-mothers or coops. When two to three months old they are taken from the coops and placed in lots of about twenty in movable houses on the pastures, where for the first few days a wire run is attached to each house. Two or three acres of meadow are reserved each year for the foster-mothers and coops. They must be kept near the farm buildings, so that someone is continually at hand to keep away the rooks, which are apparently a dreaded foe. Rats and weasels, however, give the most trouble, and have to be kept down by continual ferreting. Foxes, although the farm is situated in a hunting country, are more easily managed, and not a dozen birds have been taken by them in four years. All fowls are securely locked up at night, and the light from the foster-mothers in the fields partly serves to frighten away foxes. The best device, however, is that of running a wire across the fields, along which a good watch dog can slide his chain, and thus give the appearance of freedom. The portable houses occupy during the spring and summer about 35 acres. Each one is shifted a few yards in position every week, partly to prevent any tainting of the ground around it, and partly to prevent killing the grass underneath it. In the winter time it is more convenient to collect the houses somewhat nearer together, in proximity to the homestead, which lessens the labour and enables the birds to shelter under the ricks ; moreover, during this time of the year the birds derive little benefit from being scattered. Cattle and horses graze on the land with the poultry. After harvest, for a month or two, most of the fowls are placed on the stubbles.

The subject of Feeding is dealt with at considerable length, and the details are given under the respective heads of "Laying Hens," "Chickens," and "Table Birds." The following extracts from this section of the book may be quoted :—

"*Feeding of Laying Hens.*—Commencing with the autumn, the following is the routine generally followed. In the morning, when the hens are first of all liberated from their house, they are given warm, soft food, consisting of vegetables, corn, meat and meals. The following is the exact quantity of food

given to seventy hens in pens on one day during the last winter:—

	d.
1 lb. Pea Meal	1
3 lb. Biscuit Meal	2½
1 lb. Maize, cracked	½
2 lb. Swedes	¼
1 lb. Potatoes	¼
1 lb. Meat	½
Total	5

"In the afternoon they receive ten pounds of wheat (costing about eightpence), which is distributed on the grass, but during hard frosts or snow it is scattered on their straw and in any available suitable manure, the purpose of which is to warm the birds in their endeavour to find food.

* * *

"Our method of cooking is to put, first of all, the vegetables—*i.e.*, the potatoes and swedes—into the cooker; the potatoes are put in whole, but the swedes are cut into slices. When these are partly cooked the joints of meat are added, and the whole is left to cook from 11 a.m. to 3 p.m. the day before it is required for use. At 3 p.m. the maize, which is found to answer best when cracked, is then added. We find that if the maize is placed in the cooker at the same time as the vegetables, it adheres to them, and prevents their becoming sufficiently cooked. The supply of meat is obtained from a horse knacker, but care is taken to see that no meat from a diseased animal of any kind is brought on to the premises.

"The price paid per carcase, which is delivered in joints, varies from ten shillings to one pound, and works out at about one halfpenny per pound. The bones can be parted from the meat when cooked, and the hard bones are placed in the fire for the purpose of charring, and are then broken by an iron bar, and when cold are given to the hens, who rapidly devour them. Softer bones ground into small pieces are fed to the younger birds. The pea- and biscuit-meal is mixed with the other cooked food just before feeding, which brings the mixture into a somewhat dry, crumbly condition. Warm food and a supply of meat are considered most essential, in order to

keep up the supply of winter eggs. During the spring the pea- and maize-meal is lessened, and brewer's wet grains are used as a substitute, and in the place of swedes, mangels cut in half are given in a raw condition.

"During the summer months the morning soft food is given cold, and the pea- and maize-meal altogether discontinued. The quantity of brewer's wet grains is increased, for we find that this is very suitable during the summer time, when a bulky food satisfies the birds, without, at the same time, making them too fat. Short, plump, white oats are occasionally given in the afternoon as a change from wheat, and in very hot weather the wheat is steeped—a change which satisfies the birds at a time when they are not able to find worms, and has also the further purpose of checking them from drinking too much water. During the last two very hot summers, when the birds have been unable to find worms, granulated meat has been given. For birds in pens a supply of sharp flint grit is given *ad libitum*, as only those birds which can wander round the homestead usually find sufficient from the constant wear and tear of the roads. Chalk, bone meal or old mortar are provided in such a way that birds have always free access to shell-forming material, which is especially necessary at the time of the year when most eggs are laid.

"The soft food is served in wooden troughs, which have a bar across the top to prevent the hens from standing on the food.

"The rations of soft food and corn which we have given work out at about one penny farthing per bird per week, and adding to this another farthing for the grit and shell-forming materials, the cost per bird per week during the winter time amounts to about three-halfpence. The amount for summer foods works out at a rather less sum, as the hens during that time of the year require a smaller proportion of concentrated foods, and the worms which they find take the place of the meat diet. After the corn has been cut, the birds are placed upon the stubbles, and no food is given, as they entirely find their own.

"For birds in pens green food has, of course, to be supplied, but those at liberty naturally find sufficient for themselves."

In the section devoted to "Financial Results" full particulars are given of the expenditure and receipts, supplemented by complete balance sheets for the three years. Incidentally, the manurial value of poultry manure is discussed, and it is considered that, in any case, it is a reasonable set-off for the rent of the thirty-five acres over which the poultry actually run. The amount of the valuation and the profit realised were as follow:—

	Valuation.			Profit.		
	£	s.	d.	£	s.	d.
1898-1899	236	2	10	33	17	6
1899-1900	399	12	10	68	5	6
1900-1901	647	1	0	83	12	9

The profit represents, it is pointed out, 14, 17, and 13 per cent. respectively on the capital employed.

In conclusion, Mr. Palmer discusses "the problem of marketing," and refers to the attempt which is now being made by the National Poultry Organisation Society to facilitate its solution.

ENGLISH COPPICES AND COPSEWOODS.

PART II.

Throughout the eighteenth century, and till well on in the nineteenth, the treatment of and the profits arising from copsewoods remained very much the same as they had been in Evelyn's time, although in many parts of the country the woods had diminished greatly in extent in order to utilise the land for more profitable agricultural cultivation. A good idea of the state of many of the counties as to copses and other woodlands can be obtained from the works published for the old Board of Agriculture in or about 1813. In Vol. II. (page 133) of the work dealing with Essex it is said that, on land of good but not of the very best quality, "upon an average of the fellings of the last seven years, the underwood being fifteen years' old growth, the value of the timber, timber-tops, bark and underwood has been at the rate of nearly £50 an acre," which shows an annual return of over £3 an acre (for land and capital value of growing stock) with a fifteen years rotation.

Perhaps the best of all this set of books, as far as the copsewoods are concerned, is that written on Surrey by Wm. Stevenson (1813); and the coppices of the Weald of Surrey were then probably about the most valuable and the most carefully managed in the kingdom. They consisted chiefly of oak, birch, ash, chestnut, sallow, hazel, and alder. The oak, the principal standard, was of course barked and used for shipbuilding, etc., while the underwood was used for hop-poles, hoops, charcoal (for gunpowder and other purposes), hurdles and faggots, the market in the vicinity of London being so good that "not the smallest nor the most trifling part of the underwood is useless, or without its value." The

stores for timber were selected from seedling saplings only, and blanks in the underwood were filled—

"simply by plashing the shoots where a vacancy occurs. This is done by cutting the shoot about half through with a bill: the shoot thus cut is laid along the ground; at each of the joints a cut in the direction of the bough is made, over which a little fine mould and turf are laid; the shoot is kept close to the ground by means of pegs. At each point the shoot that is plashed will take root, and throw out several saplings. As soon as the shoot that has been plashed appears to have taken sufficient root in each of its points (which generally happens in two or three years) it is entirely separated from the parent stool; after this is done the shoot itself is divided in every point where it has taken root, and thus several stout and flourishing saplings are procured from one shoot, which are found to thrive better than the shoots managed in the usual manner, and to be less hazardous than fresh planted trees."

This is still the very best way of filling blank spaces in copse. Ash, especially, takes uncommonly well by this method and throws up strong shoots during the first year. The most profitable rotation (in 1813) was about fourteen years, but the coppices were often cut between nine and ten years, so that the farmers, who rented them, should have two crops during their twenty-one years' leases; hence the rental value was less than it otherwise might have been, although "the most common rent of copsewoods in the Weald is from 12s. to 16s. per acre." The value of the yield from coppice naturally varied considerably according to rotation, market and communications. "If the copsewood is allowed to stand only ten or eleven years, its value seldom reaches £16 per acre, unless in particularly favourable circumstances; if it be fourteen years old, and contain a good proportion of wood fit for hoops, twenty-feet hop-poles and gunpowder charcoal, the value of an acre will run from £18 to £24."

Improved communications by means of steam, the abolition of the duty on timber and other foreign imports, the use of chemical extracts for tanning, changes in agricultural methods, and the use of substitutes in place of the wood formerly supplied by coppices, have all, along with other causes, contributed to the decline of the profits from copse, till now in many parts of the country it hardly yields any tangible return worth speaking of. Even before the market for small hop-poles began to vanish owing to the introduction of posts and wire, the 2,400 to 3,000 poles per acre required could, in many places, be more cheaply supplied by the thinnings from young larch and fir plantations; and in many districts hurdles are no longer in

use to any great extent. And while the prices obtainable for coppice material now vary from only about one-sixth to one-third of what they used to be, the labour necessary for working the wood up into marketable form has gradually become both scarcer and dearer; so that after deducting the cost of the latter, very little indeed often remains as the net return from the land and the capital represented by the growing woods.

Besides these very grave drawbacks, however, there is an additional factor which very often diminishes the value of the underwoods to an enormous extent, and that is rabbits. Wherever they are allowed to exist they do damage ; and when they are allowed to multiply into large numbers, as is often the case for sporting purposes, they can, during winters in which snow lies long on the ground, do damage to an extent that it is hopeless to expect to remedy. Letting the woods for rabbit shooting then pays better than working them as copses ; but in such cases one usually omits from the reckoning a true estimate of the damage done in depreciating the capital value of the wood and the soil. Rabbit-infested coppices are often so severely damaged that the underwood is hardly worth felling ; and, of course, the standards are nothing like sufficient in number to close up and form canopy as highwoods. Old game books will prove very clearly that rabbits were not allowed to swarm in large numbers long ago ; if they had been, the copsewoods would now be in even a much worse condition than they are.

Although, of course, the English coppice woods vary greatly in character and composition, and as regards the rotation at which they are worked in order to yield produce most suitable for the requirements of the local market, yet the kinds of wood grown and the rotation are much the same as they have been for as far back as we have any exact knowledge. Hazel, ash, oak, chestnut, sallow, birch and sycamore form the bulk of the crops, worked with rotations usually varying between seven or eight up to fourteen or sixteen years, although in exceptional cases they may even extend to from twenty to thirty-five years. Hazel and chestnut prove the most durable stools as to coppicing power, and are valuable for hoops and hurdles ; but, wherever it grows well,

ash generally forms the most valuable portion of a crop. The standard trees are still chiefly of oak, some of them of great age, and many of them have been left standing long after they have attained their full maturity as timber. Aye, many of these picturesque, ancient trees have even been allowed to stand until, to quote from Coleridge :—

> "Nought was green upon the oak,
> But moss and rarest mistletoe."

Such aged trees have usually little or no value as timber, though as beautiful sylvan objects they are invaluable beyond any mere monetary estimate.

From the various causes already indicated, English coppices and copsewoods are no longer as well stocked or as well cared for as they seem once to have been. It will seldom be found that either the overwood or the underwood is in the condition which, *cæteris paribus*, can render them profitable. There has usually been little or no method adopted in the storing of standards, and the underwood is often only about half (or less than half) as thick as it might be. Patches of bracken, clumps of holly, etc., have been not only allowed to grow, but have even been encouraged, and shrubs like privet and rhododendron have been planted all over the woods, in order to make them better fitted for game coverts. If shooting form the main object for which the copses are now intended, these are certainly steps in the right direction, and more might easily be done towards this end ; but in that case it is obviously an injustice to complain about woods being unprofitable, when common-sense principles of management are thrown aside to encourage rabbits, as well as less injurious game, in place of trying to grow full and good crops of wood.

In ancient days, as is shown by the quotation from Evelyn, there was *method* in the storing and felling of the standards ; and it was "a very ordinary copse" which did not yield at each time of rotation, along with the underwood, three or four firsts, fourteen seconds, twelve thirds, and eight wavers, the statutory minimum of the young stores being twelve per acre. The names of these last differed according to time and place, *e.g.*, Standils, Storers, or Stores (Henry VIII., James I.) Stadles

or Samplers (Charles II.), Heirs and Tellers (Hants, Gloucester etc.; but the law enforced their retention, and they received far more attention than has now been the case for long past. It is only with regard to the best relative proportions regarding the storing and the clearance of the standards that we can with any advantage consult the more methodical measures adopted in copsewoods in France and Germany. As regards cutting almost flush with the ground at the fall; selecting young stores from among seedling saplings, root-suckers and the best grown of the stool-shoots; assisting natural regeneration and reproduction, and filling up of blank spaces by layering; weeding the young crop, and judicious pruning —about all these and many other practical matters we have nothing whatever to learn; we need simply try and revert to the better manner in which these operations seem to have been carried out in the days of Stevenson and of Evelyn. One is, of course, more or less tied down by the nature of the crop already on the ground, but the local market available must indicate which are the kinds o underwood to encourage, and what is likely to be the most profitable rotation. Apart from oak-coppices no longer profitable, and ash-beds and alder-moors of small extent, copses (like highwoods) are likely to yield the best returns when they are not pure, but mixed; but in the very common mixtures of hazel, ash, oak, birch, sallow, sycamore, chestnut, lime, maple, beech, etc., the local conditions will show which kinds of wood deserve the preference in selecting stores and in plashing layers. In the vast majority of cases ash and oak, but especially ash, must prove the most profitable standards, while ash, hazel and chestnut will usually be the most valuable part of the underwood. Fixing the best rotation for mixed coppices is by no means an easy matter in some parts of the country. For example, near the Severn fisheries, hazel rods of about seven years' growth are in demand, while ash has no good sale till about twelve years old. To split the difference and make the fall every nine or ten years is a compromise which may perhaps cause loss on both the hazel and the ash; and in such cases the factor ruling the situation is whatever

happens to be the principal portion of the crop. Usually, this will be found to have already adjusted itself to the prevailing local demand for poles, hurdles, hoops, faggots, etc.

The modern scientific (continental) method of storing and utilising standards must, of course, be regarded as merely for rough guidance, because it cannot possibly be followed with anything like the mathematical precision with which it is set out upon paper. The fundamental principle is that whatever the number of stores left per acre (this depending, of course, on the quality of the soil), each older class of standard should consist of one-half of such number; and at each time of cutting the coppice, there shall be felled *all* the oldest class, the *same number* of the next class, *twice as many* of the following, and *four times as many* of the next. This is intended to provide a constant supply of timber of various ages at each fall. Two examples may be given of the way in which this system is now being applied to English copsewoods:—

(*i.*) *Extract from the Working Plan Report for the High Meadow Woods, in the Forest of Dean, Gloucestershire (the property of the Crown, and administered by the Commissioners of Woods and Forests).* The copses in question are worked with a rotation of thirty-five years. "A normal store, such as may be kept in view, may be taken as :—

Age of coppice, 35 years	- - - -	40 trees per acre.
Aged 70 ,,	- - - -	20 ,, ,, ,,
,, 105 ,,	- - - -	10 ,, ,, ,,
,, 140 ,,	- - - -	5 ,, ,, ,,
	Total of all classes	75

"The general rule should be, as far as possible, to store forty trees per acre of the age of the coppice, and wherever twenty promising trees of 3 feet to 4 feet in girth are found suitable for reservation, not more than fifteen of the larger sizes should be kept. For stores of the coppice age, preference should be given to oak, larch, ash, and birch. . . . . In the next class, or 'double stores,' oak and ash should be preferred. . . . . In the 'treble stores' or older classes, oak only should be kept."

(*ii.*) *Extract from the Working Plan for the Right Honourable The Earl of Selborne's Blackmoor, Bradshott and Temple Woods, in Hampshire.* The copses in question are intended to be worked with a rotation of twenty years.

Owing to the great irregularity of the present crops, in which old standards are frequent but young stores scarce, the speedy formation of different classes of standards, varying regularly according to age, can only be achieved in course of time. With this end in view, the storing of overwood should be regulated as follows.

STORING OF OAK STANDARDS IN COPSE, THE ROTATION OF THE FALL BEING ONCE EVERY 20 YEARS.

Age-Class of Standards.	Number of Standards selected to remain.	Age.	Average Individual Growing-space at Commencement of each Rotation.	Total Area overshadowed by the Standards. Just after each Fall.	Total Area overshadowed by the Standards. Just before each Fall.
		Years.	Sq. ft.	Sq. ft.	Sq. ft.
IV. Young Stores	40	20	25	1,000	7,000
III. Double Stores	20	40	175	3,500	9,000
II. Young Trees -	10	60	450	4,500	7,000
I. Old Trees, -	5	80	700	3,500	5,000
Total,	75	...	...	12,500	28,000
Proportion of Overshadowing by Standards				about $\frac{2}{7}$ of area.	nearly $\frac{2}{3}$ of area.

NOTE.—For *ash,* the number of standards may be 50 per cent. in excess of above for oak; and mixtures of oak and ash as overwood might be calculated on these bases.

Considering the good quality of the soil, the above estimated amount of overshadowing towards the close of each period of rotation does not seem such as will prove excessively prejudicial to the coppice underwood; but the overwood is most to be considered, as likely to yield the main portion of the revenue. In addition to the clearance of the coppice, each fall will every twenty years be carried out as follows:—

Removed during each Fall. Class.	Age.	Number.	Standards left after each Fall. Class.	Age.	Number.	Remarks.
	Years.			Years.		At each fall there will therefore be removed, along with the coppice, *all* the old trees, *an equal number* of young trees, *twice as many* double stores, and *four times as many* young stores. The *average* growingspace of the standards will be $\frac{43560}{75}=580$ square feet, and the *average* distance from stem to stem will be $=\sqrt{580}=24$ feet.
Coppice - -	20	all	Coppice Stools	—	—	
IV. Young Stores-	40	20	Young Stores -	20	40	
III. Double Stores	60	10	Double Stores	40	20	
II. Young Trees-	80	5	Young Trees -	60	10	
I. Old Trees -	100	5	Old Trees -	80	5	
Total	—	40	Total	—	75	

The young stems selected as stores should be of seedling growth, if available; and in any case they should be of good, straight development, with a well-shaped, compact crown of foliage. At each fall the inferior stems of each class in the overwood should be cleared away and utilised, leaving the best to attain the larger and more remunerative dimensions. As the future prospects point to advantage in the storing of ash, this tree should, on the whole, receive the preference when selecting the standards, not only on account of a larger number being retainable per acre, but also because, thus treated, it may be expected to attain its full maturity within 60 to 80 years; whereas oak might often require 100 to 120 years, and the latter, involving five classes of standards, seems inadvisable in dealing with the small areas now under treatment. As a general rule, it will perhaps be found advisable to remove all the ash standards at the age of 80 years, and only to allow oak to grow up as old trees to 100 years of age.

Where some of the older standards may have to be removed before the fall of the coppice, they should be lopped of all large branches and of the crown, in order to reduce the amount of damage done to the underwood when felling.

As previously remarked, these figures are merely theoretical indications to be used as guides. In practice one must select the young stores as one finds suitable saplings; and in felling one must first remove all stems that are diseased or no longer thriving, or which may, for other reasons, be the less profitable if allowed to remain. But one should not, as is so often the case at present, allow large mature (or over-mature) trees to remain for another rotation simply because the bark will not strip. If the old timber trees are to be barked at all, this should be done in the spring before the fall, and not after the coppice is cut, because then the subsequent fall of the trees must damage the young spring from the stools. It will be seen from the above examples of the formation of regular *age-classes* (which it will respectively take 140 (i.) and 100 (ii.) years to establish completely) that in this continental system the number of the oldest class of trees which should be allowed to stand really determines the numbers of those in the younger classes,—and of course the number of standards that can with advantage be left so as to give the underwood any chance of forming a profitable crop depends on the quality of the soil and the amount of shade cast by the kinds of trees stored. From the quotations made from Evelyn it will be seen that he recommends a twenty years' rotation and speaks of four age-classes of standards, which exactly corresponds with the system now being introduced into the Earl of Selborne's copsewoods. Here, however, the points of similarity end, for if in ancient days there had been any regular arithmetical method about storing and utilising the

standards at each fall we may be sure Evelyn would have detailed it carefully.

The principle underlying the more scientific method can be briefly stated. On very good soil with favourable situation as many as about seventy-five standards of oak, and more of ash, may perhaps be retained with profit. This gives on the average an individual growing-space of $\frac{43560}{75} = 580$ sq. ft. per standard, and the average distance at which these would stand from each other will be $\sqrt{580}$, or about 24 ft., while the number of trees in the various age-class will be as shown above in the two tabular statements on page 485. The standards belonging to each age-class should be distributed as equally as possible over the whole area, though this is merely a sort of normal or ideal condition to be aimed at rather than really achievable.

If the quality of the land be such that the stems should not be closer than about twenty-seven feet apart, which would represent a soil and situation of fair medium quality, then there could only be about sixty standards (of oak, more of ash) per acre $\left(\frac{43560}{60} = 726\right.$ sq. ft., and $\sqrt{726}$ = about 27 ft.), and these would be distributed in the proportion of I., 4; II., 8; III., 16; IV., 32 = 60 in all.

If it seem advisable not to have them closer than thirty feet on the average, as on land of rather inferior quality, then there could only be about forty-eight stems (of oak) left per acre (30 × 30 = 900 sq. ft., and $\frac{43560}{900}$ = 48 standards), and these would be in the proportion of I., 3; II., 6; III., 12; IV., 24 = 45 in all.

And, in much the same manner, the distances at which the individual trees of each class should stand, on the average, can also be estimated. If there are four old trees of Class I., or one to every quarter acre, then their average distance will be $\sqrt{\frac{43560}{4}} = 104$ feet, or 34 to 35 yards apart; and so on. But, of course, mathematical precision of this sort is quite unattainable in practice, seeing that the selection of stores and

standards must adapt itself to the crop as found at each time of felling over the area, and that the number of standards left is also influenced by the amount of shade they cast on the underwood.

Where the land is decidedly poor in quality, the question may well arise whether it would not be more profitable to work it as simple coppice, or else to clear it gradually and replant with a crop of pines and firs. Indeed, it might often pay well (if protection against rabbits can be secured) to clear off all the marketable standards and plant up such poor hags with alternate larch and Douglas fir (or else all of the latter—and using stout plants in either case) at 10 by 10 feet (433 plants per acre), protecting them for a year or two against their being outgrown by the coppice-shoots, and then at the next fall of the underwood let the conifers grow up into pole-forest. Any undergrowth springing from the stools after that would be benificial to the larch and fir, even if not worth cutting periodically, as in the past, for its own sake.

J. NISBET.

IMPORTS OF AGRICULTURAL PRODUCE IN 1901.

The following Tables, which have been compiled from the Trade and Navigation Returns, show the quantities and values of the principal articles of agricultural produce imported into the United Kingdom during the past year compared with the similar imports for 1900. In the imports of live animals and dead meat, which are shown on Table I., there were no very remarkable changes. Notwithstanding the entire suspension of the Argentine shipment of live stock to this country, there was only a slight reduction in the entries of cattle and sheep, as larger cargoes were received from North American ports. Of cattle, the United States sent us 405,703 head, or 55,494 more than in the previous year; but Canada contributed 16,628 fewer than in 1900, her shipments last year having numbered 88,211. Both countries, however, despatched larger consignments of sheep to our shores last year than in 1900, the supplies from the former having amounted to 300,152 head as compared with 142,906; while the Dominion sent 68,010 head as compared with 35,673. In the case of cattle it is noteworthy that the total number received last year was only 9,300 head short of the supplies entered in 1899, when we received 85,365 from Argentina, the small difference being due to the fact that the cessation of the South American shipments had been followed in the interval by an increase of 82,717 head in the cargoes from the United States.

The average value per head of the cattle imported in 1901 was £17 16s. 0d., and of the sheep £1 10s. 0d.; these figures compare with £18 4s. 0d. and £1 12s. 0d. respectively in the previous year.

It will be observed that all kinds of fresh meat were received in larger quantities last year than in 1900, the in-

creases amounting to 380,616 cwts. of beef, 215,379 cwts. of mutton, and 96,114 cwts. of pork. The steady growth of the imports of fresh beef has been commented upon in earlier numbers of this Journal, and the entries of the past year show no interruption in the expansion of this trade. Of the 4,508,746 cwts. received, the greater proportion (nearly three-fourths) is contributed by the United States.

A more interesting feature of the fresh beef trade is the increase which has taken place in the shipments from the River Plate since the exclusion of Argentine live stock from our ports. In 1899 the consignments from Argentina amounted to only 150,000 cwts., in the following year they rose to 412,000 cwts., and in 1901 to nearly 772,000 cwts The declared value of the fresh beef imported last year from all sources was 39s. 6d. per cwt.

TABLE I.

Description.	Quantities.		Values.	
	1900.	1901.	1900.	1901.
	No.	No.	£	£
Cattle - - . . -	495,645	495,634	9,012,194	8,817,064
Sheep - - - - -	382,833	383,594	610,125	582,969
Total Live Animals -	878,478	879,228	9,622,319	9,400,033
	Cwts.	Cwts.		
Beef, Fresh - - .	4,128,130	4,508,746	8,162,848	8,906,839
,, Salted - - .	192,934	206,514	256,418	270,409
Mutton, Fresh - -	3,392,850	3,608,229	5,841,566	6,597,780
Pork ,, - -	695,395	791,509	1,495,393	1,715,633
,, Salted - - -	248,728	247,050	301,349	324,174
Bacon - - - - -	5,641,238	5,772,348	11,773,969	13,590,176
Hams - - - - -	1,802,670	1,860,670	4,221,809	4,528,388
Meat, Unenumerated—Salted or Fresh - -	530,688	610,271	982,169	1,120,447
Meat, Preserved - -	805,943	769,364	2,383,938	2,282,262
Rabbits (dead) - -	473,162	394,036	730,432	651,698
Total Dead Meat -	17,911,738	18,768,737	36,149,891	39,987,806

The growth of the imports of fresh mutton was interrupted by a slight decline in 1900, but there was a marked recovery

in the trade in the past year, the entries having amounted to 3,608,229 cwts., or 162,207 cwts. in excess of those of 1899, Argentina and New Zealand furnished 1,271,654 cwts. and 1,483,217 cwts. respectively of the supply received last year. The average value per cwt. of imported fresh mutton has steadily risen in recent years. In 1901 it was 36s. 7d., against 34s. 5d. in 1900, 31s. 7d. in 1899, and 29s. 7d. in 1898.

In the case of both bacon and hams there was an increase over the imports of 1900, but the quantities received last year were 32,235 cwts. and 117,956 cwts. respectively short of the entries of 1899. Of the total importation of these products in 1901 (7,633,018 cwts.) the United States contributed 5,974,865 cwts. or nearly 80 per cent. An important feature, of the bacon import trade last year was a considerable rise in value, the average having been 47s. 1d. per cwt., as compared with 41s. 9d. in 1900 and 35s. 10d. in 1899. Imported hams also participated in this rise, though to a lesser extent, the average value having amounted to 48s. 8d. per cwt., against 46s. 9½d. in 1900, and 41s. 4½d. in 1899. The total declared value of the live and dead meat imported, including dead rabbits, amounted to £49,387,839, or £3,615,629 more than in 1900.

In the group of dairy products the only changes requiring notice are an increase of 324,294 cwts. in the receipts of butter, and decreases of 118,993 cwts. and 65,983 cwts. respectively in those of cheese and condensed milk, as shown in Table II.

TABLE II.

Imports of Dairy Produce.

Description.	Quantities.		Value.	
	1900.	1901.	1900.	1901.
	Cwts.	Cwts.	£.	£.
Butter - - - - -	3 378,516	3,702,810	17,450,435	19,297,005
Margarine - - -	920,412	962,082	2,464,825	2,556,682
Cheese - - - -	2,705,878	2,586,885	6,837,883	6,227,277
Milk, Condensed - -	987,003	921,020	1,743,675	1,763,596
Milk and Cream, Fresh -	15,638	24,422	26,837	42,523
	Gt. Hundreds	Gt. Hundreds		
Eggs - - - - -	16,882,078	17,072,795	5,406,020	5,495,776

Of the 3,702,810 cwts. of butter imported last year, Denmark contributed 1,597,186 cwts., or 110,844 cwts. more than in 1900. From British Colonies we received 631,099 cwts., viz., 413,134 cwts. from Australasia, and 215,588 cwts. from Canada. The other principal contributors were—Russia, 378,452 cwts.; France, whence the imports of butter have been slowly but steadily declining for some years, 311,601 cwts.; the Netherlands, 298,912 cwts.; Sweden, 180,212 cwts.; and the United States, 150,126 cwts. Among the minor contributors to our supplies of butter last year were Germany, Belgium, Italy, Argentina, and Norway. The average value of the imports of this commodity was 104s. 3d. per cwt., as compared with 103s. 4d. per cwt. in 1900. Of cheese, 2,586,885 cwts. were imported last year, this quantity being 118,993 cwts. short of the importation of 1900; but 202,816 cwts. in excess of that of the preceding year. Canada was, as usual, credited with the greatest share of this trade, her consignments having amounted to 1,547,779 cwts., as compared with 1,511,872 cwts. in the previous year. The United States furnished 540,102 cwts., and 315,930 cwts. were provided by Holland. The average value of imported cheese last year was 48s. 2d. per cwt., or 2s. 5d. per cwt. less than in 1900.

In the case of fresh milk and cream the imports consisted of 14,474 cwts. of fresh milk, 6,379 cwts. of cream and 3,569 cwts. of preserved milk.

The increasing demand for foreign eggs has long been evident from the steady growth of the imports of these articles: the entries in 1901 were 190,717 great hundreds (120) in excess of those of 1900, and 898,039 great hundreds more than in 1899. The increase last year was due mainly to larger shipments from Russia and Denmark. From the former country we received 4,492,110 great hundreds, and Denmark contributed 3,019,414 great hundreds. Russian eggs now constitute about 25 per cent. of the entire foreign supply. Among our other purveyors of these articles last year were Germany, Belgium, France, Norway, Sweden, Portugal, Canada, Spain, United States, Egypt, and Morocco. The average declared value was 6s. 5d. per great hundred of 120.

The imports of horses, poultry, and miscellaneous animal products are shown in the next table.

It will be noticed that there was a considerable increase in the entries of wool, the gross quantity received at the ports having exceeded the consignments of 1900 by over 133 million pounds, though it was only about 23,000,000 lbs. in excess of the cargoes entered in 1899. This increase in the gross supply was accounted for by larger shipments from South America, South Africa, and Australasia. There was, however, a re-exportation last year of 293,000,000 lbs., so that the quantity retained for home consumption amounted to 394,000,000 lbs., as compared with 358,000,000 lbs. in 1900. A more remarkable feature of the import trade in wool last year was a drop of 2d. per lb. in its average value, the declared value having been 7½d. against 9½d. in the previous year.

TABLE III.

Imports of Horses, Poultry, and Miscellaneous Animal Products.

Description.	Quantities.		Value.	
	1900.	1901.	1900.	1901.
			£	£
Horses - - No.	51,786	40,856	1,350,493	1,095,673
Poultry and Game £	—	—	1,010,369	980,739
Lard - - - cwts.	1,927,274	1,966,256	3,266,582	4,037,690
Tallow and Stearine „	2,177,991	1,785,220	2,835,217	2,333,156
Wool, Sheep, Lambs lbs.	553,154,732	686,931,950	21,836,291	21,503,960
Sheepskins, undressed No.	15,057,995	15,110,299	1,599,576	1,472,674
Hides - - - cwts.	1,383,951	1,100,679	3,418,144	2,743,899

Among the imports of grain, wheat, barley and oats were received in larger quantities than in 1900, but there was a falling off in maize.

The gross consignments of wheat, and wheat flour expressed as grain, amounted to 101,102,000 cwts., a rise of 2,567,000 cwts. over the figures of the previous year. Of this total the United States contributed 66,856,000 cwts., or about 66 per cent. The other principal contributors were Canada, Argentina and Australasia; India, whence the supplies in 1900 were insignificant, sent 3,341,500 cwts. of wheat grain last year, as compared with 8,192,000 cwts. in 1899.

The average value of the imported wheat grain was 6s. 7d. per cwt., as against 6s. 10d. in 1900.

In the imports of barley there was an increase of 5,000,000 cwts. over those of 1900. This was chiefly due to larger shipments from Russia and Roumania, the aggregate receipts from these countries having been 11,876,000 cwts., or more than 50 per cent. of the entire importation from all sources, whereas in 1900 the consignments credited to these two countries amounted to 6,144,000 cwts., and to 9,133,000 cwts. in 1899. From the United States we received 2,630,000 cwts., 1,600,000 cwts. less than in 1900; while Turkey sent us in the past year 4,635,000 cwts., or an increase of 432,000 cwts. on her shipments of the preceding twelve months. The average declared value of last year's imports of barley was 5s. 7d. per cwt., or 6d. less than in 1900.

TABLE IV.

Imports of Grain and Flour.

Description.	Quantities.		Value.	
	1900.	1901.	1900.	1901.
	Cwts.	Cwts.	£	£
Wheat - - - -	68,669,490	69,747,830	23,345,929	23,089,087
Wheat Meal and Flour	21,548,131	22,575,230	10,102,548	10,341,347
Barley - - - -	17,054,990	22,091,530	5,152,977	6,218,296
Oats - - - -	20,109,560	22,476,070	5,236,409	6,349,449
Oatmeal - - -	837,440	840,335	523,765	546,132
Maize - - - -	54,151,570	51,372,800	12,327,859	12,387,342
Maize Meal - - -	1,633,505	1,638,026	456,449	475,345
Peas - - - -	2,249,182	2,042,311	780,138	747,023
Beans - - - -	1,717,760	1,871,660	536,898	631,039
Other Corn and Meal -	1,664,460	1,773,015	479,418	473,967
Total	—	—	58,942,390	61,259,027

Oats were received in 1900 in larger quantities than had ever been previously recorded, and the consignments entered last year show a still further advance of 2, 367,000 cwts. on the figures of 1900. Of the 22,476,000 cwts. imported, Russia furnished 12,608,800 cwts., or 56 per cent. The average

declared value of the imports of this grain from all countries was 5s. 8d. per cwt., as compared with 5s. 2½d. in 1900.

In the case of maize, the imports in the form of grain were 2,800,000 cwts. short of those of 1900. The United States supplied 25,565,000 cwts., or about 50 per cent. of the entire importation last year, while Roumania sent 10,017,000 cwts. Slightly more maize meal was received than in 1900. The average value of the maize imported in 1901 was 4s. 9½d. per cwt. as compared with 4s. 7d. in the previous year.

From Table V., showing the miscellaneous imports of vegetable produce, it will be noticed that there were decreases in the imports of potatoes, tomatoes, fruit (except currants and bananas), and hops. In the case of potatoes the decline amounted to 1,900,000 cwts. from the figures for 1900 which were the largest recorded imports since 1880.

TABLE V.

Miscellaneous Imports of Vegetable Produce.

Description.	Quantities.		Values.	
	1900.	1901.	1900.	1901.
			£	£
Onions - - - - bush.	7,087,105	7,295,418	852,496	869,188
Potatoes - - - - cwts.	8,910,962	7,076,882	2,234,569	1,851,862
Tomatoes - - - - ,,	833,030	793,991	792,339	734,051
Vegetables, unenumerated £	—	—	766,394	389,828
	Cwts.	Cwts.		
Apples - - - - - -	2,128,541	1,830,208	1,224,657	1,182,798
Pears - - - - - -	476,901	348,866	366,860	296,411
Plums - - - - - -	423,019	263,700	392,696	243,705
Cherries - - - - -	242.525	212,683	308,363	213,585
	Bunches.	Bunches.		
Bananas - - - - -	1,287,442	2,228,672	548,956	875,542
	Cwts.	Cwts.		
Strawberries - - - -	55,225	38,604	85,949	51,290
Currants - - - - -	64,462	70,402	87,170	75,308
Gooseberries - - - - -	26,045	21,735	14,626	11,420
Hops - - - - - -	198,494	116,042	795,479	459,051
Flax - - - - - -	1,431,720	1,511,300	2,511,810	3,070,000
Hemp - - - - - -	2,104,540	2,786,120	3,345,761	4,224,252
Clover and Grass Seeds - -	261,957	282,092	508,913	611,430
Wood and Timber (except Furniture Woods, Hardwoods, and Veneers) - - -	Loads. 9,899,137	Loads. 9,193,934	25,870,934	22,501,010

The average value of the imported potatoes last year was 5s. 2¾d. per cwt. The imports of tomatoes, which were 39,000 short of those of 1900, were of the average declared value of 18s. 6d. per cwt. Compared with the figures for 1900, there were decreases last year of 298,000 cwts. in the imports of apples, 128,000 cwts. in pears, 159,000 cwts. in plums, and 30,000 cwts. in cherries. Of bananas 2,228,672 bunches were received, valued at £875,542, as compared with 1,287,442 bunches, of the value of £548,956, in 1900. The imports of hops were 82,000 cwts. short of those of 1900, and their declared value per cwt. was a shilling less, or 79s. 2d. as against 80s. 2d.

The imports of timber (other than furniture woods, hard-woods and veneers) have decreased by about 700,000 loads, and their value by over three and a quarter millions sterling. The value per load in 1900 was 52s. 3d., while in 1901 it was 48s. 11d.

POULTRY FARM SCHOOL AT GAMBAIS.

The School of Aviculture at Gambais, near Houdan, France, was founded by Decree of the Minister of Agriculture in 1888, on a farm where the present directors had successfully carried on artificial incubation for some years previously.

The village of Gambais is situated in a district where poultry farming is extensively carried on. The value of fat pullets annually sold in recent years at Houdan has been estimated at £76,800, and the total output of the district, including sales on farms, reached £960,200.

At the farm at Gambais the appliances used are more or less the invention of the original founders, who have introduced many improvements in existing machines.

Heat, moisture, and aëration are the principal factors in the process of incubation. The heat is now arranged so as to come from above, and being thus directed on the entire surface of the drawers in which the eggs are arranged is more evenly distributed; and it is claimed as a further advantage that the eggs, by receiving the warmth from above, are, in this respect, in the same condition as if under the hen. Regular aëration is obtained by pipes running along each side of the apparatus, and an outlet at the same time secured for the carbonic acid disengaged by the embryos. The requisite degree of moisture is ensured by taking advantage of the difference between the temperature of the drawers and that of the surrounding atmosphere, the two currents being brought into contact by the lateral pipes already referred to; a moist vapour is the result, similar to that observable on the windows of a room in winter.

The new hydro-incubator used here is capable of accommo-

dating from 200 to 500 eggs, the price of the apparatus ranging from £6 to £12, the latter including drying box.

Heating is effected by small "briquettes" of compressed coal dust, which burn slowly for about 12 to 14 hours, the cost for an incubator of 250 eggs being about 1½d. for 12 hours.

The eggs are turned and re-arranged twice a day by means of an ingenious contrivance. The eggs are tested on the fifth day, in order to eliminate those which are sterile. Before being placed in the incubator, eggs are also tested as to freshness.

On the twenty-first day the incubator is opened at 7 a.m., and any eggs which are not hatched out are turned as usual. Shells showing signs of perforation are then placed with the perforated side uppermost. Chickens already hatched are transferred to the drying box. The young birds are never helped out of the eggs, except perhaps when it adheres only by a few strands of membrane.

The drying box is prepared with a layer of soft straw or hay, barley straw being preferred; forty to fifty chickens are placed in it and covered with a soft woollen cloth in summer, and with a small eider-down in winter. The next day they are brought out into the open compartment, but at this stage no food is given. After being out for five to ten minutes they are restored to the box, to be taken out again two hours later. This time they are given a few crumbs of dry bread. They soon begin to peck, and at the end of the day are as lively as a bird a fortnight old. After a day in the drying box they are transferred to the artificial mother or brooder; two of these suffice for some 450 chicks. During the first week they receive constant attention; on the third or fourth day they are given some liberty, being let out into an enclosed space a few yards square, but the moment they show signs of chilliness they are driven back under the protection of the brooder. Their range is gradually increased, and after the first week they are allowed to remain out for the greater part of the day, but in winter this is not done until they are three weeks old. The food during this early period consists of a paste made of barley meal and milk, sufficiently consistent to adhere to the

wooden billet employed for the purpose. This is kept constantly replenished.

Other feeding stuffs are added, such as crushed buck wheat and delicacies, such as bread soaked in coffee, butter milk, and green food. They are not allowed to drink before they are two days old, and then only milk and water, administered in special appliances which prevent the chickens getting wet. After the first month plain fresh water is given. It is claimed that chickens liberally fed in this manner will at the end of three and a half or four months weigh 4½ lbs., give a delicate white meat, and fetch on the market from 4s. to 5s., while if a less generous dietary is adopted, the result at the end of six months will be a lean, dark-fleshed fowl worth about half-a-crown.

Barley, maize, or buckwheat meal, from which the bran has been extracted, are used as foods, but no wheat or rye flour.

Instead of waiting, as is usual in the Bresse and Maine, until the birds are six to eight months old, the operation of fattening for the table begins at Gambais as soon as the pullets have reached the age of three and a half months.

Cages containing 50 birds are arranged along the walls of the building devoted to this purpose, which is kept warm in winter, and, as far as possible, cool in summer. The floor of these cages is covered with a thick layer of straw, which is renewed every morning. Three meals are given every day for a fortnight. The first and second consist of lukewarm liquid mash, composed of barley meal and water, but for the third the mash is made with milk or whey. At the end of a fortnight the fat begins to make its appearance. In order to give the finishing touch, 10 grammes of lard are now given at each meal. This is continued for four to five days, when the bird will be so fat that if the same régime were maintained for two days more it would succumb. If it is sought to attain the extreme limit of perfection, for the last three days eggs are added to the mash in sufficient quantity for each bird to have at least one per day. The food is given by means of a funnel specially made for the purpose. A

machine holding food for some 50 fowls is now commonly employed, by which it is said the work is much facilitated.

With respect to profits, the following figures are given; they do not, however, include the cost of labour. Taking 100 fowls at four and a-half months old, when they are ready for sale the outlay has been roughly as under:—

	Amount.
1 ton of flour, of sorts, at 8s. per cwt. - - -	£8 0 0
33 lb. of lard at 5¼d. - - - - - - - -	0 15 0
Prime cost of farm chickens hatched in incubator -	1 4 0
Dairy produce and other delicacies - - - - -	1 12 0
Total - - - - - -	£11 11 0

Or, say, 2s. 4d. per head, while the fowls can, it is said, be sold at an average price of 4s. to 4s. 5d.

At Messrs. Roullier's establishment at Gambais, the number of chickens hatched annually used to be 40,000; when they were sold as soon as they were three days old. Now that the pullets are reared until they are three weeks or a month or more old, the production is reduced to 25,000, owing to want of space.

To refer to the Gambais School of Aviculture itself, there are three terms of three months each, from February to October. Pupils of either sex are received alternately. Candidates must not be under the age of 15 years, and must have received a certain amount of general instruction, such as would entitle them to a certificate from the primary schools. The fees are £14 for the three months' course, including tuition, board and lodging.

On leaving the School, pupils who have shown capacity to act as instructors in aviculture receive a certificate of competency, which, it is said, enables them without difficulty to obtain employment in this line of industry. Some 500 pupils have passed through the School since its foundation in 1888.

[*Foreign Office Report, Annual Series, No.* 2,737. *Price* 3*d.*]

AGRICULTURAL AND MISCELLANEOUS NOTES.

Potato Planting Experiments.

Among the experiments with potatoes carried out by the Yorkshire College at their farm at Garforth in 1900-1 were tests to determine the relative advantages of planting whole sets or cut sets, and of "greening" seed potatoes in autumn.*

For the cut sets large potatoes were of course used, and were prepared a few days before planting. Immediately after being cut the wet surface of the set was dipped into ground lime.

With the exception of three varieties, a larger crop resulted from the planting of cut sets. It was not possible to have the cut sets equal in size to the whole potatoes used as "seed"; in fact, the majority of the former were larger than the uncut sets. In this way there would be a slightly greater amount of nourishment for the young shoots from the cut sets, a factor that may have produced a better growth in the early stages, and consequently a larger crop. It is more than likely also that the ground lime first of all took up a certain amount of moisture from the cut surface of the set, and in so doing formed a crust which would retard further loss of moisture by evaporation, as generally happens when potatoes are cut in the usual way, and allowed to remain in a heap for several days.

The season may very probably have a considerable influence in determining whether a larger crop is obtained from cut or uncut "seed," and confirmation of the above results is necessary before they can be regarded as at all conclusive. Subject to this, the test would show that, failing a supply of whole potatoes of "seed" size on a farm, there

* Yorkshire College Reports, No. 21.

need be little risk of a smaller crop from the use of cut potatoes, provided due care is taken to retain the moisture so necessary for the growth of the young shoot. It is obvious that from considerations of convenience in planting, etc., whole potatoes are to be preferred to cut sets. At the same time, the practice of treating cut sets in the way indicated above has been systematically carried out by several farmers in Yorkshire.

As regards the second experiment, it is usually the practice with early potatoes, after lifting in summer or early autumn, to expose those of "seed" size to as much sunlight as possible. The potatoes are consequently greened, and it is often stated that a better crop will be obtained by using "seed" that has been exposed in this way than by planting potatoes taken from a pit in spring. A test dealing with this point was conducted last year, but it was also desired to ascertain what influence, if any, similar treatment might have on a late variety. A number of potatoes of "seed" size, sufficient to plant four rows, were exposed in the autumn of 1900, and greened as effectively as possible. The potatoes were then put into shallow boxes and stored in a cool shed, precautions being taken to protect them from frost. A further number of "seed" size of the same variety grown in the same field were "pied" in the usual way in autumn. In March these were taken out of the "pie" before the buds had started to grow, were put into shallow boxes, and exposed to sunlight during the day alongside those that had been exposed in autumn. At the time of planting on May 3rd, 1901, it was seen that the sprouts of the potatoes that had been prepared in autumn were barely $\frac{1}{4}$ of an inch long, and were quite green, whereas the sprouts of those that were not prepared until spring had just started growing, and both the tuber and sprout were only slightly green. The plants were first through the ground in the four rows where greened tubers were used, and this was uniformly the case in each row. For a time they maintained this lead, but by the end of June there was no apparent difference between the strength of the haulm from the greened tubers and that from the ungreened "seed."

The following table shows that when lifted a better crop

by 1 ton 9 cwts. was obtained from the "seed" prepared in autumn than from that produced by "seed" prepared in spring :—

	Yield per acre.											
	Ware.			Seed.			Chats.			Total.		
	Tons.	cwts.	qrs.	Tons.	cwts.	qrs.	Tons.	cwts.	qrs.	Tons.	cwts.	qrs.
Greened	11	19	2	0	11	1	0	3	0	12	13	3
Ungreened	9	17	0	1	1	0	0	6	3	11	4	3

It is difficult to determine how far the greening of the tuber caused the above marked increase in crop, or to what extent that increase has been brought about by the slight difference in the length of the sprouts.

It is proposed to continue the experiments.

MANURING OF TURNIPS.

The experiments on the manuring of turnips carried out in 1899 by the West of Scotland Agricultural College yielded so little information, owing to the season having proved very unfavourable to the turnip crop, that they were repeated in 1900, and a report on them is published in Bulletin No. 9 of that College.

The experiments were especially designed to elicit information on a number of minor problems in turnip manuring. These included comparisons of the methods of applying nitrate of soda in moderate quantity, the relative advantage of nitrate of soda and sulphate of ammonia as sources of nitrogen, the relative efficacy of the three forms of potash most commonly used (kainit or sulphate or muriate of potash), and comparisons between basic slag and superphosphate. The investigations were carried on in the same manner on thirteen farms in different parts of Scotland, there being 14 plots at each centre.

The summer of 1900 was just as favourable to the turnips as 1899 had been the reverse, and the crops were sufficiently heavy to give the manures opportunity of showing any dis-

tinctive differences in their efficacy. The chief conclusions drawn are as follows :—

Nitrate of soda applied to the turnip crop at the rate of one cwt. per acre with other artificial manures will give its best results if half the quantity employed be sown in the drills and the other half be applied as a top-dressing immediately after the thinning of the crop. Nitrate of soda given wholly in the drills produces a somewhat smaller yield, but it is more effective than the same quantity applied wholly as a top-dressing after the thinning of the crop. Sulphate of ammonia given wholly in the drills is quite as effective, or perhaps rather more effective, than the equivalent quantity of nitrate of soda applied in the drills, but does not yield as large a crop as nitrate of soda applied partly in the drills and partly as a top-dressing. An equally effective method is to apply half the nitrogen in the drills as sulphate of ammonia, and half as a top-dressing of nitrate of soda.

In the growth of the turnip crop with artificial manures alone, potash forms an essential and important constituent of the manure on the great majority of farms, and its omission largely diminishes both crop and profits. Potash is required on medium and stiff loams as well as on the lighter classes of turnip soils. Kainit is the most suitable and effective form of potash manure for the turnip crop when applied in the drills in spring. Muriate of potash is somewhat less effective, while sulphate of potash gives decidedly inferior results.

While it has been shown in previous experiments that superphosphate on ordinary arable soils produces in most years a larger yield of turnips than the equivalent quantity of basic slag, the experiments of 1900 show that, in some seasons, the latter form of phosphatic manure will yield the larger crop. Seasons favourable to basic slag are those in which the autumn is wet and mild, and in which the growth of the turnip crop is prolonged to a late period. The largest and most uniform crop will be obtained, as a rule, by the use of both forms of phosphatic manure in combination. The quantity of phosphoric acid required by the turnip crop is not more than that contained in 6 cwt. superphosphate (30 per cent. soluble),

and any increase in the amount of phosphate supplied will not give a corresponding increase in the yield of crop. In unfavourable seasons, when the yield of the turnip crop is low, and also on soils in high condition, 4 cwt. superphosphate per acre will be found a sufficient quantity.

An attempt was also made to estimate the feeding value of roots manured with basic slag and superphosphate. For this purpose similar roots from two plots at two of the centres were analysed. These had received similar treatment as regards nitrogen and potash, and equal quantities of phosphoric acid, supplied, however, in the form of basic slag to the one plot and of superphosphate to the other. Judging from the percentage of total solids, carbohydrates, albuminoids, etc., the analysis of the roots from one centre seemed to indicate that the turnips receiving slag should have afforded the best feeding for stock, ton for ton; but the results from the other centre did not show any material difference in the solid contents of the roots grown with the two kinds of manure.

COD LIVER OIL AS A SUBSTITUTE FOR CREAM IN CALF REARING.

The experiments in calf rearing conducted by the Yorkshire College, Leeds, at Garforth, in 1899, and noticed in this Journal in 1900*, have been repeated, and a report on the more recent results has now been drawn up by Professor R. S. Seton. The new series of experiments were conducted for a longer period, not only for the purpose of confirming the results obtained in 1899, but also to ascertain whether the cod liver oil might not be given with advantage after weaning to the calves which had become accustomed to it.

Twelve calves, all about a week old, were purchased between March 19th and 24th, 1900. They were fed with whole milk twice a day, the allowance per head being at first six pints per day. The quantity was gradually increased until each calf, when about six weeks old, was receiving eight pints daily. At this age they were weighed, and divided into two lots; Lot I. (of four calves) to be reared on

* Vol. VII., June, 1900, p. 51.

whole milk, and Lot II. (eight calves) to have separated milk, with a small quantity of cod liver oil gradually substituted for the whole milk, upon which, up to that date, they had been reared. From May 12th no more whole milk was given to Lot II., and their diet thereafter consisted of separated milk and cod liver oil. On the same date the daily allowance of milk per head was increased in the case of both lots to ten pints. The allowance of cod liver oil to each of the eight animals had now reached 2 ozs. per day; and this quantity was maintained. On June 9th the quantity of milk per calf was increased to twelve pints per day; this allowance was continued until September 15th, after which date a gradual reduction was made, and the calves were weaned on September 22nd. As regards trough food, all the calves on June 2nd got their first allowance of a mixture of about 1 lb. of linseed cake and bran, and as much meadow hay as they cared to eat. The quantity of cake and bran was gradually increased, until, on September 22nd, each calf was getting about 4½ lbs. per day. The animals were not allowed out to graze.

The average weight on April 28th of the four calves which were to receive whole milk (Lot I.) was 1 cwt. 5½ lbs.; that of the other eight, 1 cwt. 5¾ lbs. On September 15th the whole-milk calves weighed, on the average, 3 cwts. 15 lbs., and the others, 2 cwts. 2 qrs. 4lbs.; so that the calves getting whole milk gained on the average 1·7 lbs. per head per day, and those getting separated milk and cod liver oil made 1·2 lbs. per head per day only. Thus the whole-milk calves, as in 1899, did best, but in this instance there is a much greater difference in favour of the former than in the earlier trials, when the difference was only 0·2 lbs. per head per day. The whole-milk calves also had a better "bloom."

The cost of feeding with whole milk is, however, considerably greater than that of the second method. If, as in 1899, the whole milk be valued at 8d. per gallon, the daily cost of each of the four calves is 1s. when the maximum allowance of milk was given. Calculating the separated milk at 2d. per gallon, and the cod liver oil at 5s. 6d. per gallon, the total cost for each calf in the second lot was about 4d. per day.

The difference in the average weight of the calves in the two lots is, therefore, not in proportion to the difference in cost.

The experiments of the two years, accordingly, show that separated milk with a small quantity of cod liver oil can be successfully employed in calf rearing, but that better calves result from the much more expensive system of feeding with the whole milk. As, however, there is nearly four times the amount of fat in the 1½ gallons of whole milk fed to each calf that there is in the daily ration of separated milk and cod liver oil, Lot II. might continue to get 2 ozs. of oil daily for about four times the period during which Lot I. received whole milk, before they had consumed an equal quantity of fat. In order, therefore, to determine whether the oil might not be continued with advantage to those calves which were accustomed to it, the eight calves of Lot II. were divided into two pens, to one of which the allowance of 2 ozs. of cod liver oil was continued, being mixed with their cake and meal. In all other respects the animals in the three pens were treated exactly alike.

At the commencement of this second period (September 15th) the four animals in Pen I., which had been brought up on whole milk, weighed, altogether, 12 cwts. 2 qrs. 4 lbs.; the four in Pen II., which were to receive the oil after weaning, 10 cwts. 22 lbs.; and the four in Pen III., which were to get no oil after weaning, 10 cwts. 14 lbs. On March 30th, 1901, the total weights of the three pens were: Pen I., 26 cwts. 3 qrs. 5 lbs.; Pen II., 26 cwts. 3 qrs. 15 lbs.; and Pen III., 24 cwts. 3 qrs. 24 lbs. Thus Pen II. increased in weight more rapidly than the other two, and by the end of March had drawn level with Pen I. These figures represent a gain per animal per day of 2·0 lbs. in Pen I., 2·4 lbs. in Pen II., and 2·1 lbs. in Pen III. It is a matter of considerable importance to find that the oil had so marked an influence on Pen II., for the animals in Pen III., compared with Pen I., showed very much the same difference in weight in September as they did in March. It may be noted further that even by March 30th the calves continuing to receive oil had not consumed a weight of oil equivalent to the weight of butter-fat supplied to Pen I. in the whole milk prior to September.

It therefore seems advisable to continue, for a time at least, the cod liver oil to animals which have been reared at small expense on separated milk and oil; although the results may not in every case be so profitable as in this instance.

The earlier experiments conducted in 1899 have since been supplemented by a test concerning the quality of the meat. A doubt is often expressed as to the beef of animals reared by the help of cod liver oil being equal to that of bullocks reared as calves on whole milk. To determine this, the calves which formed the subject of the 1899 experiments were all treated alike after weaning. It may be recalled that there had been three pens of calves, one of which had received whole milk, the second separated milk and cod liver oil, and the third separated milk and calf meal. The average weights, etc., of the beasts in each pen are shown in the following table:

	Pen I.			Pen II.			Pen III.		
	Whole Milk.			Separated Milk and Cod Liver Oil.			Separated Milk and Calf Meal.		
	cwts.	qrs.	lbs.	cwts.	qrs.	lbs.	cwts.	qrs.	lbs.
Weight, Sept. 9th, 1899 (when weaned)	2	1	23	2	1	20	2	—	16
Weight, March 2nd, 1901	10	3	6	11	—	15	10	—	20
Increase	8	1	11	8	2	23	8	—	4
Increase per head per day	1·734 lbs.			1·808 lbs.			1·668 lbs.		
	cwts.	qrs.	lbs.	cwts.	qrs.	lbs.	cwts.	qrs.	lbs.
Fasted Weight, March 3rd, 1901	10	1	27	10	3	2	9	3	11
Weight of Dressed Meat	6	—	7	6	1	7	5	2	14
Percentage of Carcase to Live Weight	57·97			58·66			57·08		

A statement was made to the College concerning the meat of the animals killed. It was reported that the whole-milk beasts killed the worst of the lot, only one of the three being anything like as good as the cod liver oil beasts. Calf meal beasts opened the best, there being more inside fat or suet, but they were not so good all through as the cod liver oil beasts: these were thicker on the ribs, and decidedly the

best beef. One of the calf meal beasts killed exceedingly well. They were all good beef, and very clear, there being no signs of tuberculosis in any.

From this report, therefore, there appears to be small cause for apprehension that the quality of the carcase will be affected by giving cod liver oil as a substitute for butter-fat in the early stages of the life of the animal. It remains to be seen from the 1900 experiment whether the longer use of oil has any such effect.

From the 1899 and 1900 experiments the following conclusions may accordingly be drawn:

Cod liver oil may be used with safety as a substitute for butter-fat along with separated milk for rearing calves. It is a substitute to which calves soon get accustomed; little labour is involved in its use; and, where a separator is kept, it affords a cheap means of rearing calves. It seems advisable to continue to give the oil, at least for a time after weaning, along with the cake and meal. The oil used in the early stages does not seem to have any detrimental influence on the flesh of the animals when slaughtered as bullocks.

Experiments have been commenced in 1900 with a view of confirming these results, and with the additional object of ascertaining if the more economically fed calves will graze as well as those fed in the usual manner.

WHITE SCOUR IN CALVES.

The Department of Agriculture and Technical Instruction for Ireland have published the final results of the inquiry, conducted by Professor Nocard, into white scour and lung disease of calves. Professor Nocard's preliminary report on this subject was noticed in this Journal for June last, when a summary was given of the preventive measures recommended by him. The later investigations have confirmed the conclusions of the earlier report that white scour is the result of an umbilical infection at the moment of parturition, occurring through the wound resulting from the rupture of the navel cord. The treatment consists in providing dry, clean bedding for cows about to calve, in tying the cord immediately after

the birth of the calf, and in disinfecting the region of the umbilicus and the cord, which should be cut about an inch below the ligature, with solutions of iodine. Briefly stated the essential features of the treatment are cleanliness, the use of antiseptics, and the closing of the umbilical wound.

In his preliminary report Professor Nocard established the close connection between "white scour and lung disease" of calves, and he again points out that both these diseases proceed from one and the same primitive infection of a "pasteurellic" nature and umbilical origin, and that the treatment he has recommended for the umbilical infection is equally applicable to lung disease as well as to "white scour."

The volume embodying Professor Nocard's conclusion contains also a report by Principal Mettam, of the Royal Veterinary College, Dublin, who co-operated with Professor Nocard in his inquiry into "white scour" and lung disease. It appears from Principal Mettam's report that some experiments were made in the treatment of calves suffering from "lung disease" by the injection of anti-diphtheritic serum. The results showed that this treatment can have little effect if the changes in the lungs are very serious and if these organs are largely involved; but the few experiments carried out lead Principal Mettam to believe that "if the disease is treated early, if care is exercised in the nursing and feeding, and especially if the animal is kept warm in a clean, well-ventilated house, the injection of the serum is worthy of a more extended trial as a remedial agent."

GERMINATION OF CLOVER AND GRASS SEEDS.

Some attention has recently been given at the Vienna Seed Testing Station to the loss in germinating power shown by clover and grass seeds after being stored for some years. As a result of earlier experiments made elsewhere, it may fairly be said, although the data have been too uncertain to allow of any exact inference being drawn, that well ripened seeds, properly handled and showing a high germinating percentage just after harvest, will deteriorate little when kept

under favourable conditions during several years; whereas seeds, which from the first exhibit a low germination, lose their vitality in a comparatively short time. It is clear that, for any particular variety, the percentage of loss which may be expected to occur cannot be accurately foretold. Testing will give some information, which can, however, only be regarded as fairly reliable for the particular sample examined. With these reservations, the following table may be reproduced, showing the results obtained by J. Samek, who tested the germination of certain seeds for several years after they had been gathered. The seeds were kept in paper envelopes in a room warmed during the winter.

	Percentage of Germination in the First, Second, Third, Fourth, and Fifth Year after Harvest.					Loss Per cent. in Four Years.
	First.	Second.	Third.	Fourth.	Fifth.	
Red Clover - - -	95	96	95	89	82	
,, - - -	85	83	81	80	65	17.5
,, - - -	89	93	88	83	75	
Alsike - - - -	73	64	51	37	15	79·4
White Clover - -	74	72	63	52	50	32·4
Sainfoin - - -	87	92	78	61	54	37·9
Serradella - - -	36	32	33	22	14	61·1
Lucerne - - -	98	95	98	81	79	
,, - - - -	95	93	91	74	68	23·0
,, - - - -	89	84	80	70	70	
Tall Oat Grass - -	70	66	59	43	24	
,, - - -	92	91	87	77	66	51·1
,, - - -	69	77	71	53	28	
Perennial Ryegrass -	73	80	75	66	41	
,, - - -	72	65	63	58	32	50·9
,, - - -	71	66	61	56	33	
Italian Ryegrass - -	74	68	70	60	55	38·0
,, - - -	61	56	53	49	31	
Meadow Fescue - -	72	66	61	55	32	
,, - - -	87	86	78	74	46	40·5
,, - - -	91	88	78	75	65	
Sweet Vernal - -	76	68	60	41	39	36·6
,, - - -	56	49	46	40	39	
Timothy - - -	96	93	92	88	81	9·4
,, - - - -	94	88	90	89	91	
Cocksfoot - - -	41	47	44	44	38	7·3
Fiorin - - - -	60	48	33	31	32	
,, - - - - -	71	75	59	54	43	44·8
,, - - - - -	70	69	51	48	36	
Sheep's Fescue - -	65	61	68	42	21	70·0
,, - - - - -	90	73	70	49	27	

Similar experiments were conducted in 1900 and 1901 at the Vienna Seed Testing Station with a large number of samples of clover and grass seeds. The seeds were not kept

for more than two years, and the loss in germinating power during this period was found to be very slight. It should not, however, be overlooked that in all these experiments the seeds were stored under very favourable conditions, which cannot always be ensured in practice, so that equally satisfactory results are not to be, as a rule, expected.

If clover and grass seeds are to be kept, care should be taken that they show a high percentage of germination when gathered, that they are stored free from moisture, protected where possible from draughts, and kept at an even and cool temperature.

[*Wiener Landwirtschaftliche Zeitung, 18th January, 1902.*]

THE PASTEURISATION OF MILK FOR BUTTER-MAKING.

The following account of a series of experiments on the pasteurisation of milk for butter-making has been published in the Annual Report of the Department of Agriculture of Ontario for 1900, vol. i. The experiments were conducted at the Ontario Agricultural College where vats of milk were heated before separating to various temperatures ranging between 140° and 200°; and the results were compared with heating vats of similar milk to a temperature between 90° and 100° before separating. In all the trials the milk was thoroughly mixed in a large vat, then equally divided, and one-half was heated to the temperature of 90° to 100°, and the other half to temperatures between 140° and 200°. The milk was received at the dairy at temperatures between 50° and 70°.

The following summary is given of the main results obtained:—

Milk heated to a temperature between 140° and 200° before being separated left a greater proportion of fat in both the skim-milk and the butter-milk than milk separated at 90° to 100°. The cream from the milk separated at the higher temperatures contained a higher percentage of fat, was less in bulk, churned in less time, and produced slightly more butter. There was more sediment or "mud" in the separator bowl

after running through the pasteurised milk than there was from the unpasteurised milk.

The creaming quality of the milk by the gravity process decreased with an increased temperature before setting. The whole milk averaged 4·08 per cent. fat. The skim milk contained 3·08 per cent. fat when the whole milk was heated to 180° before setting. Heating to 170° before setting produced skim-milk testing 3·2 (? 2·2) per cent. fat; heating to 175°, 1·8; to 160°, 1·6; to 150°, 1·0; and to 140°, ·88. Similar samples of milk which were set at the ordinary temperature, without heating, gave skim-milk testing an average of ·51 per cent. fat. All the lots were set for 24 hours in water which was at a temperature of 40° to 45°. Tests with the creamometer showed a very indistinct cream line in all the heated samples, and especially was this so in those heated above 140°.

The keeping quality of the butter and also of the skim-milk was much improved by heating the whole milk to the higher temperature before separating. Three boxes of butter made in May, one from unpasteurised milk, one from milk heated to 140°, and another from milk heated to 190°, were kept at an average temperature of about 55° until the 17th August. These boxes were examined from time to time, and it was found that the box made from milk heated to 190° held its flavour best and was quite as good in other respects. On the 17th August the numerical estimates for flavour were 38, 35, and 32 (max. 45), in the order of decreasing temperature at the time of separating.

The moisture content of the pasteurised butter was 10·77 per cent., one per cent. less than the sample of butter made from unpasteurised milk.

The Professor of Dairy Husbandry at the College, Professor H. H. Dean, draws the following conclusions from these results. Good butter can be made from milk and cream without pasteurisation; but pasteurisation of the milk or cream tends to produce uniformity of product and adds to the keeping quality of the butter. The higher the temperature of the milk, the better is the keeping quality of the milk and butter, but the greater is the expense for heating and cooling.

In pasteurising cream at temperatures above 160° there is probably some danger of giving to the butter a "cooked flavour," which Prof. Dean has not experienced on any butter made from milk pasteurised within the range mentioned above.

The skim-milk is also in better condition to return to the farm after pasteurisation, especially if it is heated and then cooled below 60° before leaving the creamery.

INFLUENCE OF MANURES ON THE HUMUS OF THE SOIL.

The United States "Experiment Station Record" (Vol. XIII., No. 4) contains an abstract of an article, published in the "Proceedings of the Society for the Promotion of Agricultural Science," on the subject of the effect of various manures upon the proportion of humus in the soil. Reference is made to the importance and functions of humus in the soil in general, and to a series of chemical examinations of soils from plots at the Pennsylvania Experimental Station, which have been used since 1881 for the following manurial experiments: (1) Cropping without manure, (2) manuring with stable manure and lime, (3) treating with lime alone, (4) treating with crushed limestone, (5) receiving complete mineral fertiliser containing nitrate of soda, and (6) receiving complete mineral fertiliser containing sulphate of ammonia. The chemical examinations made involved determination of (1) loss on ignition, (2) organic carbon, and (3) active humus; besides hygroscopic moisture, nitrogen and hydrogen.

The results reported show that continuous cultivation on the limestone clay soils used in these experiments has not greatly diminished the amount of humus. The greatest increase in humus was found in the case of the manuring with farmyard manure and lime, although the amount of humus was but slightly smaller in the case of a complete mineral fertiliser, a larger amount of nitrogen being found in the case of a complete mineral fertiliser containing sulphate of ammonia than in the case of that containing nitrate of soda. An examination with litmus paper showed that the limed soil was strongly alkaline, that receiving mineral

fertiliser containing nitrate of soda slightly acid, and that receiving mineral fertiliser containing sulphate of ammonia strongly acid. The unmanured soil contained three-fourths of its organic matter in active form—*i.e.*, soluble in 4 per cent. ammonia water, according to the Official-Grandeau method. The largest amount of active humus was found in the plot receiving mineral fertiliser containing sulphate of ammonia. The plot receiving manure and lime contained, both absolutely and relatively, less active humus than the unmanured plot. The supply of nitrogen was greatest in the plot receiving manure and lime. The use of lime alone apparently "rapidly diminishes humus of all kinds, and results in a marked loss of nitrogen."

CHARACTER AND CAUSES OF SOFT PORK.

In Bulletin No. 38 of the Experimental Farm series of the Department of Agriculture, Ottawa, an account is given of certain investigations undertaken in 1899, 1900 and 1901 by Mr. F. T. Shutt, M.A., of the Dominion Experimental Farm, into the character and causes of soft pork.

The first object was the determination of the difference in the chemical composition of "firm" and "soft" pork. The experiments undertaken in this direction showed very clearly that the fat of "soft" bacon contains a much larger proportion of olein than that of the "firm" bacon, with a correspondingly smaller proportion of the solid fats, palmitin and stearin; also that the melting point of the fat of the "soft" bacon was much lower than that of the "firm" quality. Further investigations indicated that the olein content and the melting point of the fat, especially the former, were more reliable than any other data for estimating the degrees of firmness in bacon; and they were accordingly adopted as standards for comparing the various samples dealt with.

A large number of experiments were made to test the effect of various factors upon the quality of the pork. Among the more important conclusions drawn from these investiga-

tions Mr. Shutt found that the chief factor in determining the quality of the pork of finished pigs was the character of the food given. He found that maize and beans tended to produce softness. The employment of skim milk not only tended to thriftiness and rapid growth, but counteracted in a very marked manner any tendency to softness; so much so that a considerable proportion of maize, if fed in conjunction with skim milk, might be used in the grain ration without injuring the quality of the pork. Of all the grain rations employed, however, that consisting of equal parts of oats, pease, and barley gave the firmest meat, besides producing a very thrifty growth and an even distribution of the fat. It was also found that rape, artichokes, turnips and mangolds could be fed in conjunction with a good ration without injuring the quality of the pork. The results of other experiments demonstrated that the fat of very young pigs and animals of unthrifty growth is softer than that of finished pigs which put on weight regularly and steadily until finished.

CURING OF CHEESE.

Several of the Experiment Stations in America have lately devoted considerable attention to various conditions which affect the ripening of cheese.

At the Wisconsin Station the influence of temperature and moisture upon the ripening of cheese was tested. Cheese was cured in a refrigerator at a temperature of 50 degs. F., in an ordinary curing room at a temperature ranging from 60 degs. to 65 degs., and at an unusually high temperature of 85 degs. The moisture in the refrigerator ranged from 86 to 90 per cent., and in the curing room averaged 95 per cent. Five series of experiments were carried out, in each of which from three to five full-sized cheeses were made from mixed milk under similar conditions. All specimens were examined from time to time, and judged by an expert who was not informed of the conditions of curing.

The value of the refrigerator cheese was placed at $3\frac{7}{8}$d. per pound, while that cured in the high temperature was rated,

because of a rank flavour, at 1½d. or 2d. only. The cheese cured at 60 degs. to 65 degs. was given at a value about equal to that of the refrigerator cheese. The high temperature very much hastened the ripening process, with the effect of lowering both the texture and the flavour, as well as developing a sharp, biting taste. Cheese cured at 55 degs. and below was invariably of good quality, though mild in flavour, while, contrary to general expectation, no bitter taste was developed. The loss in drying out was much greater with the cheese ripened at the higher temperatures. Although it took much longer to ripen cheese at a lower temperature, the quality was not only better, but the keeping period was lengthened.

At the Ontario Agricultural College several series of experiments were carried out in curing cheese at different temperatures. The Report for 1898 states that the different cheeses made under similar conditions were kept four or five months at temperatures ranging from 60 degs. to 92 degs., and judged several times by different experts. In nearly every case there was a marked difference in favour of the cheese cured at about 60 degs. The average number of points given for cheese cured at 60 degs. was nearly three more than those obtained by cheese cured at 66 degs., and five points more than that cured at 69 degs. The cheese cured at 60 degs. was better, both in flavour and texture, than that cured at higher temperatures, and was pronounced as being worth from 1d. or 1½d. per pound more than similar cheese cured at 70 degs. to 75 degs. The average monthly shrinkage in cheeses weighing about 30 pounds each, and cured at 60 degs., 66 degs., and 69 degs., was 3·40, 3·85, and 4·31 per cent. respectively.

These experiments were repeated in the following year, the curing room being divided into three compartments and kept at temperatures of about 60 degs., 65 degs., and 70 degs. respectively. The cheeses made from similar milk each day from May to October were divided into three lots and placed in the different rooms. As in the earlier work, cheese cured at 60 degs. was better than that cured at higher temperatures, though the differences were not so marked as pre-

viously. Cheese cured at 70 degs. lost one-half per cent. more in weight in one month than cheese cured at 60 degs. It is estimated that a factory making half a ton of cheese per day would lose five pounds more in curing at 70 degs. than at 60 degs., which during a season would amount to a loss of about £20 in shrinkage alone.

Experiments were also made in keeping new-made cheese at a high temperature for a week, and then placing it in cool rooms. Although advocated by some authorities, no advantage was found to result from this method of handling.

The experiments at the New York Station show very conclusively that low temperatures for curing give a much better and more uniform cheese. In 1899 four curing rooms were used, with temperatures of 55 degs., 60 degs., 65 degs., and 70 degs. respectively. The rooms were arranged so that the temperatures could be kept uniform automatically, while cloths kept continuously wet were suspended in the rooms so that the percentage of moisture would remain fairly constant. The cheeses cured at the lower temperatures proved the best, both as regards flavour and texture.

These experiments were repeated in 1900 with practically the same results.

At the Iowa Station it was also found that the best cheese was produced, and excessive losses prevented, by curing at a low temperature, and with a proper degree of moisture to prevent undue evaporation.

[*United States Dep. of Agr. Farmers' Bulletin, No. 144.*]

FEEDING RICE MEAL TO PIGS.

The South Carolina Experiment Station recently reported a test on the comparative value of rice-meal and maize-meal for pigs. The rice-meal used is described as the total by-product obtained in cleaning the rice grains for the market. It contained about the same amount of protein, fat and carbohydrates as maize-meal. The test was made with two lots of three pigs each, about five months old at the beginning of the trial. The grain was mixed with skim milk in the

ratio of 1 to 4, and the pigs were given all they would eat of the mixture. For thirty-one days Lot I. was fed with the maize-meal ration, and Lot II. with the rice-meal ration. Then for a second period of twenty-two days the rations were reversed. Considering the test as a whole, the average daily gain per pig on rice-meal and skim milk was 1·72 pounds ; the cost of a pound of gain being just under 2d., while 2·48 pounds of meal and 9·91 pounds of milk were required per pound of gain. On maize-meal and skim milk the average daily gain per pig was 1·66 pounds ; the cost of a pound of gain a little over 2¼d. ; and the food required per pound of gain 2.57 pounds of meal and 10·28 pounds of skim milk. Rice-meal thus had a feeding value equal to or greater than maize-meal. Some feeders have noticed that the use of rice-meal for fattening hogs had a tendency to weaken the intestines, but the test described above affords no data on the subject, as neither lot of pigs was fed on rice-meal for the whole of the time.

Some years ago the Massachusetts Station compared rice-meal and maize-meal as a feed for pigs in a test made with two lots of three pigs each, covering four months. The pigs were about 1½ months old at the beginning of the trial. At first the amount of grain given was about four ounces per quart of skim milk, the quantity being increased as the pigs grew older. The average daily gain per head on rice-meal was 1·41 pounds, and on maize-meal 1·42 pounds. The amounts of food eaten per pound of gain were also practically the same in both cases. From these tests the conclusion was drawn that the two feeding stuffs had practically the same value for pigs. The rice-meal appeared, however, slightly less digestible than maize-meal, but in most respects it appears to be so nearly equal as to be worthy of attention where it may be easily obtained.

U.S. Dep. of Agr. Farmers' Bulletin, No. 144.]

THE PURCHASE OF FARM AND GARDEN SEEDS.

From information they have received the Board of Agriculture consider it desirable to call the attention of purchasers

of farm and garden seeds to the provisions of the Adulteration of Seeds Acts of 1869 and 1878. Under these Acts it is a criminal offence to sell, or cause to be sold, any killed or dyed seed, or to kill or dye, or to cause to be killed or dyed, any seeds. The term "to kill seeds" means to destroy by artificial means the vitality or germinating powers of such seeds. The term "to dye seeds" means to apply to seeds any process of colouring, dyeing, or sulphur smoking. Proceedings under these Acts against any person in respect of selling, or causing to be sold, any killed or dyed seeds must be commenced within 21 days from the time of the commission of the offence.

Seeds for use on farms and market gardens should always be bought subject to a guarantee of genuineness and germination, and their germinating power should be tested to see whether the seeds come up to the standard guaranteed. The presence of dye or other colouring matter can usually be detected by rubbing the seed in soft white paper, or by washing a small quantity in water.

VOLUNTARY REGISTRATION OF HORSES FOR THE ARMY.

Financial considerations do not admit of the full establishment of horses required by the British Army if mobilized for war being maintained in peace. Under existing Acts of Parliament His Majesty's Government can impress horses for military purposes in case of emergency; but in order to avoid the inconvenience which the enforcement of these Acts might cause, and at the same time to prepare for an emergency, a system of voluntary registration has been established by the War Office, under the following conditions:—

1. Owners of 20 horses and upwards are invited to register such a number of horses as they would be prepared to sell to the Government on the occasion of a great national emergency.

2. Ten shillings per horse registered will be paid annually as retaining fee.

3. Only practically serviceable horses of from 5 to 10 years

of age, and from 15 hands to 16 hands 2 inches high will be registered.

4. Officers appointed by the Secretary of State will inspect the class of horse owners propose to register, on their premises, at least once a year, after which the final agreement will be made, as to prices, with the proprietors.

5. The Government are prepared to agree to pay in case of taking the animals, a price which would represent, (*a*) what it would cost to replace them, (*b*) the estimated loss which might accrue pending their being replaced; which price would be agreed on between the parties.

6. As it is evident that the amount of (*a*) and (*b*) above would vary in proportion to the number of horses required by Government, the prices to be agreed upon should, it is considered, be based on a sliding scale.

PLANT BREEDING.

The United States Department of Agriculture have recently issued a Bulletin from the pen of Professor W. M. Hays on plant breeding which contains a good account of the technique of the subject and some stimulating suggestions. Many look to the production of improved varieties of cultivated plants as a sure way of increasing the yield and quality, and already results have been achieved sufficiently remarkable to encourage much hope for the future. One of the most striking instances is furnished by the sugar beet, which, in Germany, in 1836, contained only 5 per cent. of sugar, and now furnishes not much short of 15 per cent. During the same time the gross yield of roots per acre has increased by about 50 per cent., so that the out-put of sugar per acre is now over four times as great as 70 years ago, a result for which careful breeding is chiefly accountable.

In this and other countries much has been accomplished in the matter of plant improvement, but much undoubtedly remains to be done. It is work that makes no exceptional demands on capital or skill, as is proved by the fact that many of our best varieties of plants, especially vegetables, flowers, and fruits, have been raised by amateurs, in not a

few cases by cottagers. It is, however, work that requires much perseverance, and, at certain seasons, much attention; though the demands that it makes on time necessarily depend upon the extent to which it is carried on.

For its successful performance it requires intelligent observation, a knowledge of the gardener's or farmer's requirements, delicate manipulation, and accurate recording, rather than strenuous exertions.

Two main lines are usually pursued to produce a new and improved variety of crop-plant. One method of procedure, which has been successfully adopted by some of the best known workers, is to make careful examination of the individual plants in crops cultivated in the ordinary way, and from these to make a selection of those that are distinguished by superior merits. Such superiority may take the form of yield, capacity to tiller, a high percentage of starch (as in barley and potatoes) or of sugar (as in the case of turnips, swedes, and mangolds), capacity to ripen early, to resist disease, &c. But whatever may be the object selected, it must be kept steadily in view, and all individuals in the progeny that fall short of the character that may have been set up must be carefully eliminated. By intelligently pursuing such a system of selection during a series of years a distinct type or variety will be produced.

The other method commonly pursued begins by artificially crossing two individuals whose superior qualities it may be desirable to unite in a single variety. The seeds that result from such a cross are sown, and it is generally found that the resultant plants are extremely mixed in character. Many are inferior to either of the parents, others occupy an intermediate position, while a few may be superior to both. It is the latter only that are reserved for subsequent cultivation, and from their progeny also many individuals must be eliminated. In the course of time, however, the percentage of inferior individuals becomes smaller and smaller, until, at last, the variety comes true to type.

In the main these two systems of improvement are the same. The plants selected in the first case, may be natural crosses, while, in the second, they are artificial crosses;

but the improvement is, in both cases, completed by selection. The larger the number of plants selected or of crosses effected, the greater are the chances of a really valuable new variety being found, and for this reason it is desirable to work with large numbers, though, of course, one may be fortunate in producing a valuable variety even when the work is being carried on on a very small scale.

In sowing pedigree seeds the soil should, as a rule, be of good quality, so that the resulting plants may have the opportunity to produce the maximum yield. But it is of even greater importance to arrange matters so that each individual plant is placed in possession of precisely the same conditions of growth. Only in this way can we be sure that the appearance of superior qualities in the progeny is due to something inherent in the plant itself, and not to the specially favourable character of the situation where it has been grown.

Farmers have generally given more attention to the breeding of animals than of plants, but just because less has been done in the latter field, more, probably, remains to be accomplished. It is surprising how quickly a single plant multiplies if the conditions be made as favourable as possible. The late Mr. Shirreff gives an instance from his own experience. In the spring of 1819 he found a specially vigorous wheat plant in a field on his farm in East Lothian, and he resolved to propagate it. He therefore removed the plants in its neighbourhood and gave it a dressing of manure, the result being that, notwithstanding some damage by hares, he harvested from this single plant 63 ears, containing 2,473 grains. In the following autumn these grains were dibbled in wide rows in a suitable piece of ground, and in the two succeeding seasons the produce was sown broadcast. The result was that the fourth harvest from the original plant yielded 42 quarters of seed, which was subsequently placed on the market under the name of Mungoswells wheat.

UNITED STATES BEET-SUGAR INDUSTRY.

The growth of the beet-sugar industry in the United States during the past ten years is illustrated by the follow-

ing statement, taken from a recent issue of Willett and Gray's Statistical Sugar Trade Journal, giving the quantities of beet-sugar produced, and the number of factories in operation each year, from 1892-93 to 1901-02 :—

Years.	Sugar Produced.	Factories Operated.
	Tons (2,240 pounds).	No.
1901-02	*150,000	39
1900-01	76,859	34
1899-00	72,944	31
1898-99	32,471	15
1897-98	40,399	9
1896-97	37,536	7
1895-96	29,220	6
1894-95	20,092	5
1893-94	19,550	6
1892-93	12,018	6

*Estimated.

In 1892-93, this industry was carried on only west of the Mississippi, three of the six factories then in operation being located in California, two in Nebraska, and one in Utah. At the taking of the census of 1900, the number of factories in California had increased to eight, in Nebraska to three, and in Utah to four. The industry had, moreover, been taken up to a varying extent in nine other States. Ten factories were in operation in Michigan, making this State, in point of the number of factories, the leading State in the Union ; three factories had been established in each of the States of New York and Colorado, and single factories had been erected in Ohio, Illinois, Minnesota, New Mexico, Oregon, and Washington. The capital invested in the industry in 1900 amounted to £4,366,000.

[*U.S. Crop Reporter, January*, 1902.]

THE SADDLE HORSES OF NEW SOUTH WALES.

The *Agricultural Gazette* of New South Wales contains an interesting report by Mr. Bruce, the Chief Inspector of Stock, on the deterioration of the saddle horses of the colony. From about 1810 to 1850 the riding horses of New South

Wales ranked second to none. They were the progeny of some of the best and stoutest thoroughbreds imported from Great Britain, and they were reared under favourable conditions of climate, country, and pasture. Since 1850, however, there has been, according to the Chief Inspector's report, a great deterioration in this class of horses bred in the colony. This change is not due to any alteration in the natural conditions, which are still as favourable as they were seventy years ago; but it is attributed to a combination of causes. The discovery of gold led to a withdrawal of labour from the unenclosed stations, with the result that the straying horses of different owners not only intermixed, but even interbred without any regard to breed or limit of age. At that time there was a great demand for draught horses at the mines, and mares which should have been retained for saddle and light harness horses were put to draught stallions. Another source of deterioration, which is said to still exist, is the practice of breeding from worn-out mares and exercising little judgment in the selection of sires. From about 1860 to 1880 New South Wales was, it is stated, completely over-stocked with horses, the majority of which were of an inferior description, and with the consequent fall of prices, breeders gave less and less attention to the management of their studs, and in many cases replaced their horses by sheep. Another more potent and slower agency in this process of degradation is, it is held, the increase of racing and betting, and the relaxation of the rules of racing, which have encouraged the production of light, weedy, speedy horses, useless, as a rule, for anything but racing.

A rapid and effective improvement in the class of horses suitable for the saddle, cavalry, and artillery can, the Chief Inspector thinks, be brought about by the establishment of confirmed breeds of saddle and light harness horses; or by making the thoroughbred a more suitable sire for them. Breeders are recommended to take up the business in a systematic and practical manner, by purchasing a stout thoroughbred sire, and one or more of the following English horses: Cleveland Bay, Yorkshire coaching-horse, the Anglo-Norman, the English hackney, the Norfolk trotter, or the

Welsh pony, selecting stout, roomy, short-legged, well-bred mares of the right stamp, carefully mating the progeny, selecting all the mares from which stock of the right stamp are bred, continuing to breed strictly within these lines, even though comparatively close at first, until the breed is thoroughly established, and jealously preserving it when once it is so, unless any falling-off should be observed in the spirit and pluck of the breed, when temporary recourse could again be had to the right class of thoroughbred.

That horses of such a stamp would eventually pay better than thoroughbreds there is, in the Chief Inspector's view, no doubt, for not only is there a large demand for them for ordinary use, as well as for cavalry and police, but India, China, South Africa, and England will, he thinks, be buyers for far more horses of this description than New South Wales or the other colonies can breed. Mr. Bruce recognises, however, that the establishment of a confirmed breed of high class saddle horses would take a considerable time even if the enterprise were taken up at once, and he therefore suggests that steps should be taken to remedy the defects of the thoroughbred as a sire by a modification of the rules of racing. In his opinion this might be effected by legislation which would lay down such length of races and such weights, according to the class and age of the horses, as would prevent any but stout, useful, weight-carrying, long-distance horses from going on the Turf; and thus provide suitable sires for the production of saddle and light harness horses of a similar stamp.

LIVE STOCK IN SWITZERLAND.

The following table shows the results of the enumeration of the live stock in Switzerland on the 19th April, 1901, with the corresponding figures for earlier years:—

Live Stock.	1901.	1896.	1886.	1876.
Horses	124,869	108,969	98,622	100,935
Mules	3,077	3,125	2,742	3,145
Asses	1,789	1,740	2,046	2,113
Cattle	1,340,375	1,306,696	1,212,538	1,035,930
Swine	555,261	566,974	394,917	334,515
Sheep	219,438	271,901	341,804	367,549
Goats	354,634	415,817	416,323	396,055
Bee-Hives	242,544	254,109	207,384	177,825

The number of cows, included with the cattle in the above table, was 739,922 in 1901; 688,052 in 1896; 663,102 in 1886, and 592,463 in 1876.

[*Statistischs Jahrbuch der Schweiz*, 1901.]

LIVE STOCK IN ARGENTINA.

The Board of Agriculture have received through the Foreign Office a dispatch from His Majesty's Consul at Buenos Ayres, transmitting a report on the show held by the Argentine Rural Society in Buenos Ayres in September last. In this report it is stated the highest prices realised for Shorthorn bulls exhibited at the show were £700, £680, and £610 respectively, while fifty Shorthorn bulls offered for sale by six stud-farms realised an average of £317 each. Eight heifers of the same breed averaged £60, but there was no class for milch cows.

In connection with the exhibits of cattle, it is pointed out that in the Argentine Republic there is virtually only one recognised breed of horned stock—viz., the Shorthorn. The patrons of Herefords are few, and fewer still are those who favour Polled Angus. As for the other breeds, such as Devons, Holsteins, Swiss, and Channel Islands, they are so few in Argentina as hardly to be worth mentioning. The national census of 1895 revealed the fact that there were 21,701,526 head of horned cattle in the Republic, of which the Durham breed, pure and cross-bred, claimed 2,425,844, while only 314,553 Herefords were counted.

By far the largest number of sheep exhibited were of the Lincoln breed, but there was also an excellent show of Merinos, chiefly Rambouillet. The large number of the latter was, it is stated, a surprise to many, and it is regarded as an indication that there will be a revival of the Merino in consequence of the low price of long wool. In the Lincoln breed, the champion sheep was sold by auction for £142, the next highest price for this breed being £117, while the third prize animal fetched £104.

The number of Lincoln rams presented for show and sale far exceeded the demand, and many remained unsold at the

close of the show. Some of these were subsequently sold at low prices, as little as twelve shillings being realised for animals that three years ago would have fetched at least four to six pounds sterling. Black and brown faced breeds were poorly represented. Hitherto Shropshires and the Down varieties have met with little favour in Argentina, owing to the poorness of their fleeces, but signs are not wanting that their day is coming, and that at no distant date there will be a demand for them. The Shropshire, for example, stands the excessive heat of the more northern lands far better than the Lincoln, and its carcase is more sought after by freezing companies, since it is smaller, and the meat is of finer quality than that of the Lincoln. It is generally expected that with the restoration of peace in South Africa, a large field will be opened up there for Argentine live stock.

DAIRY EXHIBITION AT BRUSSELS.

The Board have received information through the Foreign Office that a Dairy Exhibition will be held in Brussels on the 26th, 27th, and 28th April, under the direction of the National Dairy Society of Belgium. It will be held in the *Parc du Cinquantenaire*, where a cattle show will be held simultaneously.

The exhibition will include Belgian and foreign dairy products, and articles connected with their manufacture. It will be divided into several sections, of which one will be exclusively devoted to centrifugal machines and churns; another to recently introduced dairy methods and appliances, etc. Exhibits relating to dairy instruction will also form a special feature of the exhibition; and a conference will be held on the 27th and 28th April, when discussions will take place on various subjects which are of primary interest to the dairy industry. Exhibitors will be allowed special rates for the carriage of their goods on the Government railways. Entries must be sent in before the 1st April, and full information relating to the exhibition, as well as to the conference, may be obtained from M. Armand Collard Bovy, Secretary of the National Dairy Society, Verviers, Belgium.

AGRICULTURAL STATISTICS OF NEW ZEALAND.

Statistics of the principal corn crops in New Zealand in 1900-01 were given in the September number of this Journal; and the following additional particulars (taken from the Annual Report of the New Zealand Department of Agriculture for 1901) may now be given:—

Crop.	1900-1901.	1899-1900.
	Acres.	Acres.
Potatoes	28,524	36,984
Turnips	404,333	415,462
Mangolds	7,341	8,051
Rape	124,318	125,367
Rye grass	23,270	39,543
Cocksfoot	35,758	54,718
Live Stock.	**No.**	**No.**
Horses	266,725	262,390
Cattle	1,256,680	1,232,139
Sheep	19,355,195	19,348,506
Swine	250,975	249,751

It is estimated that 169,000 tons of potatoes were harvested, as compared with 224,000 tons in the preceding year.

The "New Zealand Trade Review" gives the area under wheat in 1901–02 as 165,000 acres and that under oats as 371,000 acres. These areas are considerably less than in 1900–01, and it is expected that the average yield will also not be as good as in the last season.

The quantities of the principal agricultural articles exported in 1900-01 were as follows:—Wool, 136,716,000 lbs. frozen mutton, 1,791,000 carcases; lamb, 1,353,000 carcases; butter, 185,000 cwts.; cheese, 109,000 cwts.; grain and flour, £973,000. With the exception of wool, these exports showed an increase in 1900-1 as compared with 1898-1899; but, in the case of frozen mutton, a falling off from the totals shown for the intermediate year, 1899-1900, is noticeable.

The export trade in dairy produce has shown great expansion of recent years, the aggregate value of the butter and cheese exported in 1900-1, viz., £1,039,000, being more than

twenty times that of the amount shipped in 1883. There were 251 dairy factories and 255 creamery stations in the Colony in 1901, in addition to 372 private dairies for butter-making and 78 for cheese. A dairy commissioner was appointed in 1900, with a staff of graders, instructors, and clerical assistants, who are stationed at the various centres of production to advise producers, and grade the products for export.

PRUNE GROWING IN THE UNITED STATES.

The prune industry of the Pacific North-West, including the States of Oregon, Washington, and Idaho, has attained considerable dimensions of recent years. Beginning with a few trees in 1860, the plantations have increased until at the present day there are 50,000 acres of commercial prune orchards in these three States, and they form the leading fruit industry of their sections. It has been estimated that a light crop from the present acreage would yield about 40,000,000 pounds of the evaporated product, while a full crop would amount to not less than three times that quantity. The approximate value of the trees, together with the equipment, including apparatus, evaporating and packing plants, is estimated at about £4,000,000, while it is calculated that the aggregate value of an average year's crop from the orchards would not be less than £500,000.

Nearly 80 per cent. of the plants in the Pacific North-West are of the kind known as the Italian prune, the remaining 20 per cent. being nearly all of the "Agen" variety. The peach is the common stock for the plum in this district, though, during the past few years, the Myrobalan plum has been used to some extent.

With the rapid increase in the prune-bearing acreage in the Pacific North-West since 1895, there has been a great decline in the average market price of the product. During 1880-1890 prices ranged from about 4d. to 6d. per pound, but in 1900 the crop of Italian prunes only realised a little more than 2d. per pound. Moreover, recent improvements in fruit refrigeration have affected the dried fruit industry by

materially lengthening the season during which fresh fruits of many kinds may be marketed at moderate prices. Notwithstanding this competition and the fall in prices, prune-growing in the Pacific North-West still yields a fair remuneration to the grower, and it is anticipated that, by attention to quality and packing, the market for the evaporated fruit will continue to increase.

[*Prunes and Prune Culture in Western Europe.—U.S. Department of Agriculture, Division of Pomology, Bulletin No.* 10.]

FRUIT-GROWING IN CALIFORNIA.

The fruit industry of California may be said to have originated in the fruit trees planted by the Franciscan monks during the establishment of their missions in the district, but the industry did not attain any great importance until the gold excitement of 1849, when growers made considerable profits in selling their produce at the exorbitant prices which then prevailed.

At the present day there is hardly a section of the State in which there may not be found large orchards devoted to one or more of the many varieties of fruit trees. The high mountain valleys are adapted, both as regards climate and soil, to the raising of the hardy northern varieties of fruits, and between these and the low valleys of the south may be found conditions suited to the production of nearly all kinds of fruit known to commerce.

In 1900 there were in the State 16,193,000 fruit-bearing trees, and 13,209,000 non-bearing, or 29,402,000 trees altogether, covering an area of 452,000 acres.

Of the total number of trees, 8,073,000 were prune trees, 5,522,000 peach, 3,652,000 orange, 2,745,000 apricot, and 2,163,000 olive trees, requiring 117,000 acres of ground for the prune trees, 80,000 acres for the peach trees, 53,000 for the orange trees, 40,000 for the apricot trees, and 45,000 acres for the olive trees. In addition, there were 157,000 acres devoted to the cultivation of grapes.

Carriage of fruit from California forms an important item in the annual tonnage of the transcontinental railroads

and a considerable quantity is also shipped by sea. In 1890 the fruit sent out of California, including canned and dried fruits, by rail and by sea amounted to 144,000 tons; while the corresponding figure for 1900 was 464,000 tons.

[*Statistics on the Fruit Industry of California, U. S. Dep. of Agric., Division of Statistics, Bulletin No. 23, Misc. Ser.*]

AUSTRO-HUNGARIAN TRADE AND THE NEW GERMAN TARIFF.

The Board have received through the Foreign Office a summary of a lecture delivered at Budapest in January last by Herr C. Hieronymi, a former Minister of State in the Hungarian Government, as to the influence which the proposed new German tariff may be expected to produce upon Austro-Hungarian trade.

Herr Hieronymi stated that the total imports into Austria-Hungary from Germany amounted in 1900 to over £26,000,000, the exports to that country being £39,000,000; while, considering only the articles liable to duty, Austria-Hungary exports to Germany almost double what it imports.

Wood and timber occupy the foremost place among the exports, the amount sent to Germany representing a value of almost £6,000,000, out of a total of over £10,000,000. Germany is practically the exclusive market for the raw material (hard and soft wood) and sleepers, and it is thought that the trade in these two items will not suffer, inasmuch as no increase in duty is contemplated. The exportation of sawn wood, however, appears to be threatened, since Germany obtains all its foreign timber from Russia and Austria-Hungary; and a consideration of the rates of freight and of the increased duty on sawn timber renders it probable that the saw-mills will suffer considerably, more especially those lying near the frontier. On the whole, the lecturer expects that the exports of timber will not fall off, but that there will be an increase in the proportion of raw material as compared with sawn.

Next in importance is the export of eggs, of which the amount sent to Germany has risen in value from £800,000 in

1891, to £3,300,000 in 1900, Hungarian eggs accounting for about £550,000 of the latter sum. This trade, Herr Hieronymi thinks, will suffer to some extent from the proposed increase of duty, but the loss incurred might be made good by stimulating the trade with England and Switzerland, more especially the former.

As regards corn, the exports of rye and oats to Germany have never been of importance, Germany's needs of these two requirements being supplied by Russia and America. The wheat export may also probably remain unaffected, for, although this was once considerable, the statistics show a large falling off since the reduction of the duty in 1891. The case of barley is different, as the trade with Germany in this grain is important and increasing: the value of such exports in 1900 was £2,000,000, in addition to £1,200,000 of malt; the average quantity during 1890—1900 being 1,760,000 qrs. of barley and 645,000 qrs. of malt, representing altogether 2,450,000 qrs. of barley, on the assumption that 133 lbs. of barley yield 100 lbs. of malt. As the corresponding total export from Austria-Hungary is some 3,265,000 qrs., Germany thus takes about three-fourths. Germany appears to be, to a constantly increasing extent, dependent for part of its supplies upon foreign barley, of which Austria-Hungary contributes about a third; and the lecturer thought therefore that in this case the tax would fall entirely upon the consumer, and that exports would remain undisturbed. As the duties on barley and malt are proportionate, he advocates the establishment of malt factories throughout the country, more especially in Hungary, so as to secure the profits of the conversion of barley into malt.

The export of flour to Germany, it is considered, will cease altogether, and millers are recommended to attempt to find a wider market in England.

The proposed duty on cattle is so heavy that Hungarian dealers are of opinion that the export of horned stock will be impossible, and that of fresh meat stopped altogether. It is anticipated that, thanks to the rise in price which is expected to follow the imposition of the new duty, cattle breeding will be carried on in Germany on a far larger scale than at present;

and that that country will consequently have very little, if any, need of imported meat. Austria-Hungary may thus be expected to look elsewhere for a market for her meat, and would naturally turn to England, although it is felt that in this instance there are much greater difficulties in the way of establishing a trade than in the case of other commodities.

New South Wales Bread Act.

The Board have received through the Colonial Office a copy of an Act passed last year to regulate the sale of bread, and to prevent its adulteration, in New South Wales.

This Act provides that all bread shall be made from the flour or meal of wheat, barley, rye, oats, buck wheat, Indian corn, peas, beans, rice or potatoes, and with any common salt, pure water, eggs, milk, barm, leaven, potato, or other yeast. The addition of other substances (including alum) is prohibited.

Bread is to be made in loaves of 1, 2, or 4 lbs., and bakers selling loaves under weight are liable to a penalty unless they can prove that such bread was baked more than 24 hours previously; this provision does not, however, apply to the sale of fancy and other bread. Bread of wheat-flour, which flour without any mixture or division is the whole produce of the grain (the bran or hull only excepted), and which weighs two-thirds of the wheat whereof it is made, shall be called "standard wheaten bread." Wheaten bread made from an inferior flour shall be called "household wheaten bread" and the loaves must be marked with a large H. Bread made wholly or partially from any other flour shall be called "mixed bread" and marked with a large M.

The mixing of any ingredient with corn or flour, or the selling of one kind of flour for another, is prohibited. This provision does not apply to material employed for cleansing or preserving grain against smut, insects, etc., provided it be effectually removed before grinding.

Harvest Weather Forecasts.

The Meteorological Council has arranged a special service of forecasts for the benefit of agriculturists and others during the summer months (June to September inclusive). The forecasts are based upon special telegraphic reports of observations taken at 2 p.m. at a selected number of reporting stations, and refer to the 24 hours from midnight of the day of issue. The forecasts are sent by telegraph to those who express a wish to receive them regularly, and who defray the cost of the telegrams. The number of recipients of these forecasts for various periods in the summer of 1900 was 129. It showed a remarkable increase over the number of applications in 1899, which only reached 20.

Agricultural Labour in 1901.

Agricultural labourers were, for the most part, in full employment throughout the year; although casual labourers experienced some slight irregularity of employment in several districts. In the summer and autumn, owing to drought, the hay and corn crops, and also the root crops, are stated to have been generally light, so that casual men were not greatly in demand; while at the end of the year extra hands again lost a little in some districts through farm work being in a forward state, owing to the fine weather in the autumn. Generally speaking, the supply of men was better than in 1900.

[*Labour Gazette, February, 1902.*]

Orris Root.

The Florentine orris root (*Iris florentina*) is an indigenous root cultivated in the province of Florence as well as in other parts of Tuscany. It is a variety quite distinct from the German Iris or Orris (*Iris communis*), and it is much more appreciated and sought after on account of its well-marked violet perfume, and the largeness and whiteness of its root. The harvest generally takes place in the month of July when the plants are two or three years old, according to their development.

The plants are removed from the soil with a pitch-fork, and the roots cut from the stalks, cleaned, and afterwards peeled by means of a special knife. After peeling, the root is repeatedly washed in clear water, and spread on mats and dried in the sun. It is afterwards placed on the market either in its natural state, or shaped in beads, or reduced into an extremely fine and soft powder for the toilet. This industry has been in existence for half a century, for the orris root, although not altogether unknown to the farmer, was formerly considered of no value and thrown away as a useless and injurious plant. It was after 1842 that its merits became gradually known, and for the last 20 years its cultivation has been greatly extended. The industry is at present a source of moderately good profits, the production of orris root being nearly 6,000 cwts. per annum.

[*Foreign Office Report, Miscellaneous Series, No.* 570.]

Free Import of Agricultural Machinery into Russia until 1903.

A recent report to the Foreign Office by H.M. Consul General at Odessa contains the reminder that certain agricultural machines may be imported into Russia duty-free, and their spare parts either free or at a reduced rate, until the 18th December, 1903. Full lists may be seen in the *Board of Trade Journal* for July and October, 1898. The Consul General does not know whether this period of indulgence will be extended, but he points out that the present time is opportune for business purposes, as regards the absence of import duty.

Among agricultural implements imported into Russia, harvesters, binders, mowers, reapers, and horse rakes are supplied mainly by the United States. Steam threshers are supplied by British manufacturers, but German firms have followed British models, and are gaining a footing in the market by giving longer credit and selling more cheaply.

Single and double ploughs, drills, broadcast seeders, hand and horse-power threshing machines are made in Russia, and

are also imported from Germany. Scythes and sickles are imported from Austria.

[*Foreign Office Report, Annual Series, No. 2743.*]

Use of Silage for Milch Cows.

The Government Dairy Expert of New South Wales, writing on the subject of ensilage, remarks that there is no reason why silage, fed to dairy cows, should taint milk, provided that it has been properly saved and made from suitable material. Ensilage, he points out, is simply exercising a rough control over the process of fermentation, which all green plants will undergo when cut. This fermentation is caused by micro-organisms, many of which will also set up in milk and cream fermentations which are very detrimental to the manufacture of good butter, cheese, or condensed milk. Hence, when silage is fed to dairy cows, care should be taken that none of the pieces get into the milk. In fact, it is wiser not to feed it while the cows are being milked, as the organisms may float about in the air, and it should be fed after, rather than immediately before, milking. Silage which has become considerably decomposed and smells very strongly should never be fed to cows when being milked, or while milk is close to the fodder troughs, as the odour from it is so strong that the milk absorbs it, and becomes tainted in this manner, if in no other.

[*Agricultural Gazette of New South Wales, December, 1901.*]

Chilian Wheat Imports.

In his report to the Foreign Office, (Annual Series, No. 2736) Sir Berry Cusack-Smith mentions that owing to the failure of the Chilian wheat harvest of 1900, a large quantity of wheat was imported into that country from Australia and the United States. During the eight years, 1892-1899, the total imports of this cereal only amounted to about 5,000 tons; but in 1900 over 20,000 tons, of an estimated value of about £120,000, arrived, though it is doubtful whether in

most cases the cargoes proved very profitable. At the date of the report, the harvest prospects for 1901-2 were very favourable, but the actual acreage under wheat was estimated to be smaller than usual. Consequently, although nothing like 20,000 tons will be required during the current year, the importation of wheat into Chili may be expected to be somewhat above the normal.

Bulgarian Eggs in Belgium.

The United States Consul at Brussels has recently informed his Government that Belgium is a good market for the sale of fresh eggs and that large quantities are annually imported from various European countries. The supply formerly came almost entirely from Italy, but Bulgaria has recently become a strong competitor, and in the year 1900 nearly 10,000,000 lbs. of eggs were exported—eggs are sold by weight in Bulgaria—representing a value of about £90,000. The Consul adds, moreover, that the exportation of eggs from Bulgaria increased threefold during the past year.

Poultry Diseases in Belgium.

The Belgian Government have issued a decree, dated 29th August last, which came into force on the 14th September, prohibiting the importation of fowls suffering from certain diseases. The importation of fowls is only permitted at certain frontier stations (including Antwerp, Ghent, and Ostend). Imported fowls are examined by a veterinary surgeon, at the expense of the importer; the fee being 2c. or $\frac{1}{5}$d. per head. Fowls found suffering from diphtheria, contagious coryza (discharge from the eyes), or chicken cholera, are refused admission, and will be turned back, or they may, if the importer prefers, be at once slaughtered.

Algerian Cork Forests.

The growing of cork is an industry of yearly increasing importance in Algeria. The cork tree only becomes profitable after having undergone a process called "démasclage," which consists in stripping the tree of its virgin bark. After this operation a fresh skin grows every year, and the aggregation of these annual skins, when united, form the cork of commerce; but from ten to twelve years must elapse after the process of stripping before the tree produces cork of a marketable value.

The annual production of the State cork forests during the past three years has ranged from 86,000 cwts. to 100,000 cwts.

In view of the necessity which has arisen in recent years of supplying the market with cork of a greater thickness than was formerly in demand, the Government has instituted in the State forests a minimum thickness for stripping of 25 millimetres (1 inch).

[*Foreign Office Report, Annual Series, No.* 2,710, *price* 2½*d.*]

Milk Flour.

The United States Consul at Gothenburg reports that Dr. M. Ekenburg, of that city, has invented an apparatus by which milk can be reduced to a powder, like flour in appearance, but possessing all the qualities of milk in concentrated form, moisture excepted. This milk flour is said to be completely soluble in water, and can be used for all purposes for which common milk is employed. It is claimed that it does not get sour or ferment, and that it can be kept and transported in tin cans, barrels, bags, etc. The inventor estimates the cost of production at little more than 1s. per 100 quarts; and thinks that milk-flour from skim milk can be sold for about 6½d. per lb. The invention is considered to be mainly of importance for the utilisation of skim milk, much of which has hitherto been wasted, but which can in the dry form be easily transported without loss of quality.

[*U.S. Consular Reports, February.*]

German Meat Regulations.

The Board have received information through the Foreign Office that regulations have recently been issued under §21 of the Meat Inspection Act of 1900*, prohibiting the preparation or importation of meat treated with boracic acid and its salts, formaldehyde, salicylic acid and its compounds, and certain other chemical substances. The use of colouring matters of all kinds is also prohibited, except their application to make margarine yellow and for colouring the skins of sausages, so long as such use is not contrary to other existing regulations. These provisions come into force on the 1st October, 1902.

[**Journal of the Board of Agriculture*, Vol. VII., September, 1900, p. 240.]

The British Barley Society.

The Board have received a notification of the formation of a society to be known as the British Barley Society. The objects of the Society are stated as follows:—To improve the character and quality of barley; to aid growers in every way by furnishing the fullest information as to soils, seed, rotation and manures, stacking, threshing and dressing; to encourage the better use of barley, and to foster arable cultivation of the soil, etc. The offices of the Society are at 11, Queen Victoria Street, E.C.

REPORTS ON FOREIGN CROPS.

United States Wheat Harvest.

According to the January number of the *Crop Reporter*, the returns collected by the Department of Agriculture at Washington indicate that the average yield per acre of wheat for the past season in the United States was 14·8 bushels, as compared with 12·3 bushels in 1900 and a mean of 13·3 bushels in the last ten years. According to data supplied in earlier numbers of the *Crop Reporter*, the total area under wheat in 1901 was about 43,326,000 acres, and from the figures now available as to the average yield on that area, it appears that the total wheat crop of the country last year amounted to about 641,000,000 bushels, as compared with 522,000,000 bushels in 1900.

Crops in India.

In the first general memorandum on the wheat crop of India during the season of 1901-02, it is stated that the excellent harvest of last spring will not be equalled, the conditions which prevailed during the sowing season having been unfavourable for the repetition of the extensive sowings of last season. In Northern India there has been a great contraction in the area placed under wheat, a decrease of 1,500,000 acres being recorded in the Panjab, most of it on unirrigated lands. The monsoon rains towards the end of the summer were scanty, and ceased prematurely. In Central and Western India, also, conditions were unpropitious, and rain was badly needed. At the time of writing (December) some rain had set in, and it is thought that, if this were to prove the beginning of a period of normal and general rainfall, the prospects would be greatly improved.

THE RUSSIAN HARVEST OF 1901.

The Central Statistical Committee of the Ministry of the Interior has recently issued the following estimates of the production of the chief cereals and potatoes, in 1901, in the Russian Empire.

Production in 1901.

Governments.	Wheat.	Rye.	Barley.	Oats.	Potatoes.
	qrs.	qrs.	qrs.	qrs.	qrs.
50 Governments in Europe -	39,874,000	79,110,000	22,661,000	53 945,000	75,690 000
10 „ „ Poland -	1,795,000	5,906,000	2 469,000	5,741,000	38,413 000
4 „ „ Caucasus -	8,378,000	923,000	3 073,000	1,220,000	1,448,000
4 „ „ Siberia -	2 057,000	1 817,000	240,000	2,205 000	1,757,000
4 „ „ Steppes -	1,205 000	44,000	258 000	702 000	143,000
Total 72 Governments -	53,309,000	87,800,000	28,701,000	63,813,000	117,451,000

The yield of the other minor crops is also given as follows:—Spelt, 544,000 quarters; buckwheat, 3,593,000 quarters; millet, 7,624,000 quarters; maize, 7,955,000 quarters; lentils, 682,000 quarters; beans, 304,000 quarters; and peas, 2,232,000 quarters.

CROPS IN ARGENTINA.

The Board have received through the Foreign Office a copy of a report drawn up by H.M. Consul at Buenos Ayres, giving the estimate of the Ministry of Agriculture concerning the production of wheat and linseed in the Argentine Republic in 1901–02. The figures are as follow:—

Province.	Wheat.	Linseed.
	Tons.	Tons.
Buenos Ayres - - - - - - -	1,150,000	154,000
Santa Fé - - - - - - - -	500,000	122,000
Entre Rios - - - - - - -	133,000	42,000
Cordoba - - - - - - - -	70,000	9,500
Remainder of Republic - - - -	70,000	—
Total - - - - - -	1,923,000	327,500

It is said that the crops in Cordoba have been very poor, in Santa Fé and Entre Rios indifferent, and in Buenos Ayres very good. The total yield will, in all probability, be an average one, the deficiency in the northern districts being counterbalanced by the abundant harvest in Buenos Ayres. The quality of the wheat is average, while that of linseed is said to be unusually good.

CROP PROSPECTS IN FRANCE.

An official report on the condition of the autumn sown cereal crops in France was published in the *Journal Officiel* of the 15th ultimo.

The acreage under wheat, mixed corn, rye, barley, and oats is given for each Department, and the following numerical method is adopted to indicate the condition of the crops; the figure 100 denotes "very good"; 80, "good"; 60, "fairly good"; 50, "passable"; 30, "mediocre"; and 20, "bad".

The annexed table gives the number of Departments grouped on the above scale according to the condition of the crop.

Index No.	Wheat.	Mixed Corn.	Rye.	Barley.	Oats.
100	1	2	5	2	2
99 *to* 80	34	44	54	34	31
79 *to* 60	41	19	22	17	25
59 *to* 50	9	5	4	2	6
49 *to* 30	2	—	1	1	—

Mixed corn is not grown in seventeen Departments, rye is not grown in one, winter barley in thirty-one, and winter oats in twenty-three Departments.

THE SWEDISH HARVEST OF 1901.

The official estimates of last year's crops in Sweden indicate that the harvest gave, on the whole, a yield below the average, but that the quality was good. The following figures, giving estimated results, issued by the Swedish Statistical

Bureau, are calculated on the quantity of seed sown, and on reports received from the prefects of provinces.

Crop.	Production in 1901.	Average Production 1891–1900.
	Bushels.	Bushels.
Wheat	4,176,700	4,346,400
Rye	21,421,400	21,945,800
Barley	12,954,400	13,626,000
Oats	55,210,400	61,403,700
Mixed Corn	8,373,000	9,038,200
Peas	889,100	1,394,800
Beans	190,600	201,900
Vetches	532,700	698,000
Potatoes	44,841,800	52,192,800

DANISH HARVEST OF 1900.

According to the returns published by the Danish Statistical Bureau, the harvest of 1900 was more abundant than that of the previous year, the total yields of all the leading crops, except wheat and hay from clover and grass under rotation, being above those recorded for 1899. The estimated total production of each of the principal crops for 1900, with comparative figures for 1899, is shown below :—

Crop.	Total Production.	
	1900.	1899.
	Bushels.	Bushels.
Wheat	3,469,000	3,517,000
Rye	19,207,000	17,671,000
Barley	21,973,000	20,882,000
Oats	38,820,000	35,685,000
Potatoes	22,458,000	18,144,000
Mangolds	140,435,000	112,714,000
	Cwts.	Cwts.
Sugar Beet	16,404,000	14,204,000
Clover and grass under rotation	12,955,000	16,003,000
Grass meadows and permanent pasture	12,133,000	11,553,000

CROPS IN NOVA SCOTIA.

The Provincial Government Crop Report of Nova Scotia for November last gives an account of the results of the har-

vest in that province for the past season. It is stated that, owing to the dry weather experienced during the summer, all field crops, with the exception of the hay crop in Nova Scotia proper, were under average, and the yields less than those obtained in 1900. The drought also affected grazing lands, and consequently there was a decrease in the products of the dairy; while live stock was not in as good condition as in 1900. Prices for potatoes, grains, and dairy produce, however, ruled high, so that farmers were, in a great measure, compensated for the poor harvest.

The fruit crop was fairly abundant and the quality excellent; and, owing to the failure of the apple crop in the upper Canadian provinces and in parts of the United States, high prices were obtained for the crop.

PARLIAMENTARY PUBLICATIONS.

Departmental Committee on Butter Regulations.—Interim Report [*Cd.* 944]. *Price* 1*d.*

Information relating to the constitution and objects of this Departmental Committee has already been given in this Journal (page 216). The Committee recommend in this Interim Report, which deals solely with the question of water in butter, the adoption of a limit of 16 per cent. for the proportion of water in butter, to be fixed by a Regulation under Section 4 of the Sale of Food and Drugs Act, 1899, and they make this recommendation on the assumption that butter containing a larger percentage of water than 16 per cent. will escape the operation of this limit, provided that a sufficient disclosure is made to the purchaser.

Agricultural Statistics, Ireland.—Extent in Statute Acres and Produce of the Crops for the year 1901 [*Cd.* 894]. *Price* 3½*d.*

The conditions prevailing in Ireland last year were exceptionally favourable to the growth of crops. The average yields per acre of cereals, roots, potatoes and flax not only showed increases as compared with 1900, but were also in every case above the mean of the preceding ten years, the hay crop only showing a decline. Owing, however, to the smaller areas under all the leading crops in 1901, except mangolds and hay, the aggregate results of the harvest are not altogether satisfactory. The total yields of barley, potatoes, turnips, mangolds and flax are above the normal, but the figures for wheat, oats, bere, rye and hay fall

short of the mean for the period 1891-1900. The following table shows the area, production and yield per acre of the principal crops in Ireland, with comparative figures for the decennial period 1891-1900.

	Area.		Production.		Yield per Acre.	
	1901. Acres.	1891-1900 Acres.	1901. Bushels.	1891-1900 Bushels.	1901 Bushels.	1891-1900. Bushels.
Wheat - - -	42,934	54,089	1,470,127	1,695,499	34·2	31·3
Oats - - -	1,099,335	1,193,586	51,069,001	52,029,361	46·4	43·5
Barley - - -	161,534	170,318	6,530,716	6,527,942	40·4	38·3
Bere- - - -	150	234	4,847	7 109	32·3	30·3
Rye - - - -	11,001	12,615	280,661	299,958	25·5	23·7
			Tons.	Tons.	Tons.	Tons.
Potatoes - - -	635,321	700,941	3,372,214	2,577,505	5·3	3·7
Turnips - - -	289,759	305,181	4,884,301	4,485,327	16·9	14·7
Mangel Wurzel and Beet Root	77,457	55,183	1,451,780	870,474	18·7	15·7
					Stones.	Stones.
Flax - - -	55,442	64,378	13,275	11,416	38·3	28·8
For Hay. Clover, Sainfoin and Grasses under rotation	617,330	631,428	1,306,687	1,344,572	Tons. 2·1	Tons. 2·1
For Hay. Permanent Pasture or Grass not broken up in Rotation	1 561,262	1,527,027	3,433,055	3,493,985	2·2	2·3

The quantity of honey produced in the country in 1900 was nearly double the average quantity for the preceding ten years, but below the quantity returned for 1899. The actual quantity of honey produced in 1900 was 623,559 lbs. or 284,718 lbs. above the normal; while the amount of wax manufactured is estimated at 6,743 lbs. The number of stocks brought through the winter of 1900-1901 was 33,171, of which 16,754 were in hives having movable combs, and 16,417 in other hives.

Agricultural Statistics, Ireland, 1901.—*Report on Irish Migratory Labourers* [*Cd.* 850]. *Price* 2½*d.*

The number of Irish agricultural labourers who sought temporary work in Great Britain in 1901 is given in this

return as 19,732, or 710 in excess of the corresponding number in 1900. Nearly four-fifths of the total, viz., 15,318, were natives of the province of Connaught; Mayo, with 10,074 migrants, as usual contributing a greater number to this total than any other county. The numbers furnished by the other counties of Connaught were:—Galway, 2,005; Roscommon, 1,994; Sligo, 947; Leitrim, 298. The total number furnished by Ulster last year was 3,010, of whom 2,386 were natives of Donegal. The province of Leinster sent 751, while 653 came from Munster.

The proportion which the migratory labourers bore to the total population of Ireland was 4·2 per thousand, the ratio in Mayo being 46·1 per thousand. The majority, viz., 14,534, shipped to England; 3,960 went to Scotland; while 1,238 sought employment in other districts of Ireland. It is estimated that the average earnings brought back to Ireland by each migrant to Great Britain were £7 11s., which would represent in the aggregate a sum of £123,000 for the season.

PRICES OF LIVE STOCK RETURNED UNDER THE WEIGHING OF CATTLE ACT.

The particulars furnished to the Board of Agriculture in the Returns made under the Markets and Fairs (Weighing of Cattle) Act, 1891, during the last quarter of 1901, enable the complete figures for that year to be presented in the accompanying tables, and offer an opportunity of comparing with earlier data the statistics of live weight prices now available. The Acts passed in 1887 and 1891, by requiring the provision of facilities for the weighing of live animals, and by enforcing the collection of certain statutory returns from a number of typical places, have made it possible for agriculturists to obtain a closer knowledge than ordinary market reports can supply, respecting the value of animals to which the test of the weigh-bridge is applied.

The places originally selected for these returns of price were fourteen in England and five in Scotland. In 1898, the number of returning markets was raised to the total of twenty-one. These places are enumerated in the table on page 556, and the list includes some of the principal live stock markets in the kingdom and also places representing the characteristic trade of smaller markets. Although the public weighing of farm stock in Great Britain has increased much less rapidly than was anticipated, the returns for the past nine years, taken in the aggregate, nevertheless indicate some progress in the application of the weigh-bridge to the sale of cattle, and although this cannot be held to be the case as regards sheep and swine, useful comparisons of the development of the system of ascertaining price by reference to weight can be secured by reviewing the figures annually given for cattle.

From these data it appears that while the total number of

cattle entering the scheduled markets in each of the past nine years has fluctuated with the conditions of the seasons, the absolute number of those returned as weighed has year by year shown an increase, and the proportion of the weighed cattle to the total number has gradually advanced from 7·59 to 13·46 per cent., as is shown in the following table :—

Years.	Cattle Entering the Scheduled Markets.	Cattle Returned as Weighed.	Proportion of Number Weighed to Number Entering.
	No.	No.	Per cent.
1893	1,219,208	92,492	7·59
1894	1,203,533	96,344	8·01
1895	1,186,149	100,033	8·43
1896	1,000,014	109,184	9·93
1897	1,115,183	111,767	10·02
1898	1,263,991	138,652	10·97
1899	1,236,091	139,482	11·28
1900	1,187,603	141,611	11·92
1901	1,161,516	156,289	13·46

The improvement shown in this respect was thus, it appears, more marked in 1901 than in any preceding year.

Since these figures are the aggregate of reports from districts where the practice of weighing has as yet made no perceptible advance, as well as from quarters where its advantage to the farmer is more generally recognised, there is reason to suppose they may be taken to represent not unfairly the position as regards the cattle markets of Great Britain generally, and thus to indicate a slow, but nevertheless steady, advance in agricultural opinion in this matter.

The practice of the public weighing of stock still prevails to a very much greater extent in Scotland than in England. A total of 88,684 beasts, or about one-third of the total number exhibited in the six Scottish scheduled towns, is returned as passing over the weigh-bridge in 1901; while only 67,605 head, or less than one-thirteenth of the number entering, were weighed in the fifteen scheduled markets of England. It may, however, be remembered that in the preceding year the number of cattle returned as weighed at English markets was 57,989 only, so that nearly 10,000 more cattle were weighed in 1901 than in the preceding twelve months. The English proportion of the number entering the markets now

shown to be weighed has thus crept up to 7·57 per cent., as compared with 2·22 per cent. in 1893. This is a relatively greater advance than in Scotland.

The following table shows the aggregate number of cattle, sheep, and swine respecting which particulars have been received during the past year. The number of sheep weighed showed a further decline compared with 1900, and it may be noted that about two-thirds of those for which prices were supplied were weighed at Aberdeen alone.

Animals.	1901.	1900.
CATTLE:	No.	No.
Entering Markets	1,161,516	1,187,603
Weighed	156,289	141,611
Prices returned	131,792	124,648
Prices returned with quality distinguished	109,590	104,318
SHEEP:		
Entering markets	4,314,232	4,325,613
Weighed	39,371	43,581
Prices returned with quality distinguished	32,439	36,312
SWINE:		
Entering markets	383 875	442,216
Weighed	2,167	2,196
Prices returned with quality distinguished	2,161	2,120

The extent to which advantage was taken in 1901 of the weighing facilities provided at the scheduled markets will be seen from the table on page 556, in which the number of cases in which prices were distinguished is also shown. In three of the English markets—Birmingham, Lincoln, and York—although nearly 119,000 cattle in all were exposed for sale during the year, none are returned as having been weighed; and at Ashford, Bristol, and Norwich the number was insignificant. In the case of Salford, although the number weighed increased from 2,974 in 1900 to 4,116 in 1901, the market authorities have again failed to return the price at which the animals were disposed of in any single instance. This absence of information contrasts very unfavourably with

the results of the returns from Aberdeen, Dundee, and Falkirk, where prices were recorded for every head of cattle weighed, amounting in the aggregate to 35,328. Prices were quoted also for all the cattle weighed at Edinburgh and at Perth, although the information furnished from these places was to some extent defective.

From the returns supplied by the market authorities at the thirteen towns named in the table below, the average live-weight prices for three grades of cattle have been calculated for 1901 as follows :

PLACES.	INFERIOR or Third Quality.			GOOD or Second Quality.			PRIME or First Quality.		
	Number.	Price per Stone	Price per Cwt.	Number	Price per Stone	Price per Cwt.	Number.	Price per Stone	Price per Cwt.
		s. d.	*s. d.*		*s. d.*	*s. d.*		*s. d.*	*s. d.*
Carlisle - -	2,280	3 5½	27 8	2,489	3 10¾	31 2	5,116	4 4	34 8
Leicester - -	2	3 5¾	27 10	233	3 9¼	30 2	680	4 3¼	34 2
Leed - -	18	3 6	28 0	352	3 8¼	29 6	1,115	4 3¼	34 2
Liverpoo - -	606	3 3½	26 4	1,328	3 9½	30 4	6,668	4 3¼	34 2
London - -	13	3 8½	29 8	1,888	4 3¾	34 6	3,545	4 9½	38 4
Newcastle -	—	—	—	722	4 1½	33 0	2,360	4 7¼	36 10
Shrewsbury -	474	3 8	29 4	1,025	4 1¾	33 2	380	4 5½	35 8
Aberdeen - -	5,433	3 3	26 0	7 363	4 3	34 0	9,019	4 6½	36 4
Dundee - -	1,777	3 3¼	26 2	5,616	4 3½	34 4	2 367	4 7½	37 0
Edinburgh -	—	—	—	14,253	4 4¾	35 2	490	4 8¾	37 10
Falkirk - -	948	3 11¾	31 10	1,493	4 4¼	34 10	953	4 7½	37 0
Glasgow - -	1,304	4 2¾	33 10	2,544	4 3¾	34 6	7,808	4 6	36 0
Perth - -	9	4 2¼	33 6	597	4 5¼	35 6	625	4 8¾	37 10

Prime quality cattle thus ranged in price in 1901 from 38s. 4d. per cwt. (4s. 9½d. per stone) in London to 34s. 2d. per cwt. (4s. 3¼d. per stone) in Leicester, Leeds and Liverpool. Prices current at the Scottish markets, though not reaching the level of the Metropolis, were distinctly above those recorded for the rest of England. For second quality beasts, the range was from 35s. 6d. per cwt. (4s. 5¼d. per stone) at Perth, to 29s. 6d. per cwt. (3s. 8¼d. per stone) at Leeds. The returns for cattle classed as inferior or third quality

beasts are in many cases too small to possess any statistical value. The lowest level of price recorded was reached at Aberdeen, where 5,433 animals averaged 26s. per cwt. of live weight, while at Dundee 1 777 animals of the same category realised a price per cwt. only 2d. in excess of that figure.

Comparing the prices shown in the statement below for 1901 with those for 1900, a decline in value, though not to a very marked extent, is apparent :

PLACES.	INFERIOR or Third Quality.		GOOD or Second Quality.		PRIME or First Quality.	
	1901.	1900.	1901.	1900.	1901.	1900.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Carlisle	27 8	27 6	31 2	31 2	34 8	35 2
Leicester	27 10	32 8	30 2	30 0	34 2	34 0
Leeds	28 0	28 6	29 6	29 8	34 2	34 4
Liverpool	26 4	26 6	30 4	30 8	34 2	35 4
London	29 8	26 6	34 6	34 10	38 4	39 4
Newcastle	—	27 0	33 0	35 8	36 10	38 8
Shrewsbury	29 4	29 2	33 2	33 2	35 8	36 6
Aberdeen	26 0	27 4	34 0	34 8	36 4	38 2
Dundee	26 2	27 0	34 4	35 2	37 0	37 10
Edinburgh	—	30 8	35 2	36 4	37 10	38 4
Falkirk	31 10	30 8	34 10	34 10	37 0	37 8
Glasgow	33 10	32 8	34 6	34 0	36 0	36 10
Perth	33 6	35 4	35 6	36 4	37 10	38 8

In the first quality cattle a fall, varying on the average from 2d. to 1s. 10d. per cwt., is observable at each market except Leicester. For the second quality at Carlisle, Shrewsbury, and Falkirk the price was stationary; and although at Leicester and Glasgow values were higher on the year, there appears to have been a slight decline at the majority of the markets.

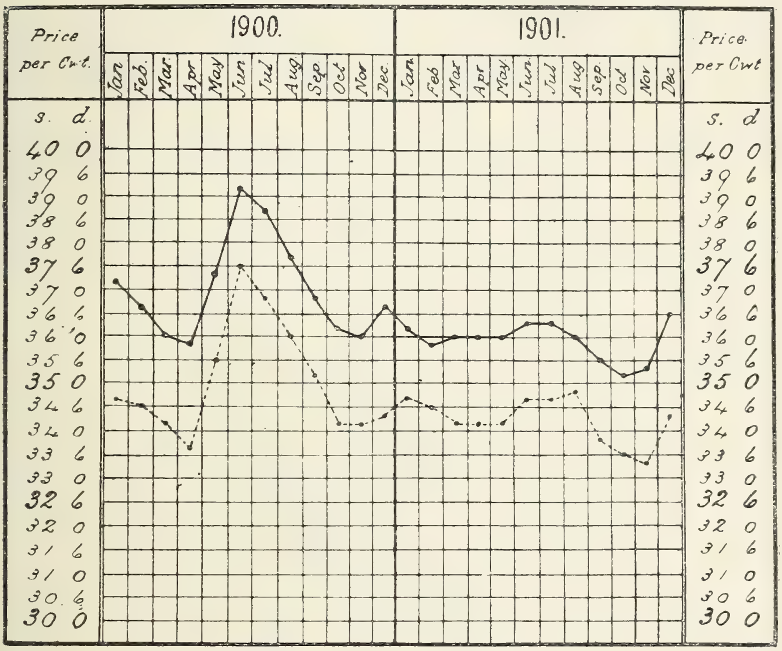
The prevailing rates obtained for first and second quality cattle, as represented in the aggregate of the returns from these thirteen fairly typical markets, have been summarised month by month in the following table, which probably

affords a reliable indication of the general trend of prices in Great Britain during the past three years:

Months.	Good or Second Quality.						Prime or First Quality.					
	1901.		1900.		1899.		1901.		1900.		1899.	
	Per cwt.		Per cwt.		Per cwt.		Per cwt.		Per cwt.		Per cwt.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
January - - -	34	8	34	8	32	6	36	2	37	2	34	6
February - - -	34	6	34		32	6	35	10	36	8	34	8
March - - -	34	2	34	2	32	10	36	0	36	0	34	10
April - - - -	34	2	33	8	33	2	36	0	35	10	35	2
May - - - -	34	2	35	6	33	4	36	0	37	4	35	6
June - - - -	34	8	37	6	35	2	36	4	39	2	37	0
July - - - -	34	8	36	10	35	4	36	4	38	8	37	0
August - - -	34	10	36	0	33	4	36	0	37	8	35	6
September - - -	33	10	35	2	32	4	35	6	36	10	34	2
October - - -	33	6	34	2	32	4	35	2	36	2	34	2
November - - -	33	4	34	2	33	4	35	4	36	0	35	2
December - - -	34	4	34	4	34	4	36	6	36	8	37	2

A considerable rise in values took place in the summer months of 1900, but in October of that year a decline was recorded to a little over 36s. per cwt. prime quality, and prices remained within a few pence of the same level until September in the following year, when, as will be seen, they fell to 35s. 6d. per cwt. for prime cattle, and to 33s. 10d. per cwt. for second quality. In October and November values were a few pence lower, but the close of the year saw a rise of about 1s. per cwt. in each case, average for December being 36s. 6d. for prime, or 2d. less than in 1900 and 8d. less than in 1899. For second quality the December average stood at 34s. 4d. per cwt., which was the same average figure as that recorded at the same date in

the two preceding years. The diagram reproduced below shows the course of these prices during 1900 and 1901.



First Quality ———— Second Quality..........

The number of recorded sales of fat cattle at an agreed price per cwt. or per stone live weight would appear to have fallen to 10,632 as compared with 14,023 head in 1900. These actual sales by live weight were reported as having taken place during the year at the ten markets of Leicester, Liverpool, London, Newcastle, Wakefield, Bristol, Dundee, Edinburgh, Falkirk, and Glasgow, but more than one-half of the transactions recorded came from the latter city.

The weighing of store cattle, on the other hand, seems to have been more freely resorted to in the past year, as the number weighed, for which prices were recorded at the scheduled places, increased from 11,396 in 1900 to 14,054 in 1901. Of this total 11,376, or about four-fifths, were reported from Shrewsbury. The prices realised at that market would seem to indicate some decline in values for this class of stock.

The usual tables are appended.

I.—CATTLE, SHEEP, and SWINE *entering and weighed at the Markets and Marts of the undermentioned Places in the* YEAR **1901**, *as returned under the Markets and Fairs* (*Weighing of Cattle*) *Act*, 1891 (54 & 55 *Vict. c.* 70).

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Ashford	12,755	96	—	95,876	—	—	20,855	—	—
Birmingham	24,357	—	—	76,198	—	—	192,291	—	—
Bristol	31,143	87	87	98,162	—	—	10	—	—
Carlisle	55,535	9,865	9,865	275,668	—	—	13,996	—	—
Leicester	53,271	1,282	1,060	74,645	118	109	6,168	—	—
Leeds	32,431	1,485	1,485	121,427	3,156	3,156	503	—	—
Lincoln	8,885	—	—	68,153	—	—	11,035	20	20
Liverpool	57,604	8,602	8,602	414,138	3,920	3,920	14	1	1
London	71,240	14,888	5,446	491,525	6,692	78	5,210	—	—
Newcastle-upon-Tyne	99,938	3,092	3,092	370,298	23	23	41,508	1,847	1,847
Norwich	110,320	170	—	176,198	40	—	12,898	—	—
Salford	117,615	4,116	—	545,257	—	—	3,273	—	—
Shrewsbury	59,018	16,821	13,255	86,296	—	—	28,354	6	—
Wakefield	73,465	7,101	1,576	190,662	110	—	5,145	7	7
York	85,680	—	—	163,267	—	—	3,990	—	—
SCOTLAND.									
Aberdeen	50,826	22,103	22,103	178,972	21,355	21,355	9,799	—	—
Dundee	17,728	9,831	9,831	25,446	2,303	2,303	2,699	—	—
Edinburgh	71,072	32,125	*16,905	228,860	—	—	9,106	—	—
Falkirk	10,107	3,394	3,394	11,307	—	—	140	—	—
Glasgow	64,929	13,018	11,658	367,393	546	387	4,748	6	6
Perth	53,597	8,213	*1,231	254,484	1,108	1,108	12,133	280	280
TOTAL for ENGLAND	893,257	67,605	44,468	3,247,770	14,059	7,286	34,525	1,881	1,875
TOTAL for SCOTLAND	268,259	88,684	*65,122	1,066,462	25,312	25,153	38,625	286	286
Total	1,161,516	156,289	*109,590	4,314,232	39,371	32,439	383,875	2,167	2,161

* Prices for 15,220 cattle in addition to the above were quoted from Edinburgh and for 6,98 cattle from Perth, but without distinguishing the quality.

II.—CATTLE, SHEEP, AND SWINE, *entering and weighed at the Markets and Marts of the undermentioned Places in the* FOURTH QUARTER *of* **1901**, *as returned under the Markets and Fairs (Weighing of Cattle) Act*, 1891 (54 *and* 55 *Vict. c.* 70).

PLACES.	**Cattle.**			**Sheep.**			**Swine.**		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Ashford	4,382	22	—	24,214	—	—	6,642	—	—
Birmingham	5,211	—	—	12,624	—	—	61,310	—	—
Bristol	10,636	—	—	17,322	—	—	10	—	—
Carlisle	19,751	2,571	2,571	63,854	—	—	4,165	—	—
Leicester	14,809	461	332	22,790	31	22	2,091	—	—
Leeds	7,661	295	295	23,725	—	—	14	—	—
Lincoln	2,094	—	—	13,024	—	—	2,425	—	—
Liverpool	22,984	3,611	3,611	81,019	582	582	12	—	—
London	22,300	4,731	1,447	90,605	935	—	1,980	—	—
Newcastle-upon-Tyne	28,288	613	613	82,440	—	—	14,586	330	330
Norwich	41,434	45	—	23,050	—	—	1,326	—	—
Salford	36,270	1,072	—	98,678	—	—	716	—	—
Shrewsbury	16,523	7,701	4,972	18,077	—	—	7,432	—	—
Wakefield	18,505	2,329	587	37,803	—	—	414	—	—
York	32,702	—	—	76,884	—	—	1,267	—	—
SCOTLAND.									
Aberdeen	17,102	6,469	6,4	26,128	4,302	4,302	3,025	—	—
Dundee	4,338	2,316	2,316	5,934	520	520	649	—	—
Edinburgh	23,826	9,674	*5,530	56,050	—	—	2,488	—	—
Falkir	2,947	923	923	3,499	—	—	49	—	—
Glasgow	19,105	3,688	2,958	96,111	91	74	1,203	—	—
Perth	13,738	1,391	*263	87,670	282	282	3,130	72	72
TOTAL for ENGLAND	283,550	23,451	14,428	686,109	1,548	604	104,390	330	330
TOTAL for SCOTLAND	81,056	24,461	*18,459	275,392	5,195	5,178	10,544	72	72
Total	364,606	47,912	*32,887	961,501	6,743	5,782	114,934	402	402

* Prices for 4,144 cattle in addition to the above were quoted from Edinburgh, and for 1,128 cattle from Perth, but without distinguishing the quality.

III.—CATTLE, SHEEP, AND SWINE, *entering, weighed, and priced at the Scheduled Places in Great Britain, in the* FOURTH QUARTERS *of* **1901** *and* **1900**.

Animals	4th Quarter, 1901.	4th Quarter, 1900.
	No.	No.
CATTLE :		
Entering markets - - - -	364,606	361,388
Weighed - - - - - - -	47,912	40,954
Prices returned - - - - - -	38,159	34,305
Prices returned with quality distinguished - - - - -	32,887	29,102
SHEEP :		
Entering markets - - - -	961,501	957,010
Weighed - - - - - - -	6,743	10,733
Prices returned with quality distinguished - - - - -	5,782	8,902
SWINE :		
Entering markets - - - -	114,934	130,680
Weighed - - - - - - -	402	420
Prices returned with quality distinguished - - - - -	402	420

IV.—*Prices of* FAT CATTLE *in the* FOURTH QUARTER *of* **1901**.

PLACES.	INFERIOR or Third Quality.			GOOD or Second Quality.			PRIME or First Quality.		
	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.
		s. d.	*s. d.*		*s. d.*	*s. d.*		*s. d.*	*s. d.*
Carlisle - -	856	3 5½	27 8	546	3 10	30 8	1,169	4 4½	35 0
Leicester - -	2	3 5¾	27 10	108	3 9¾	30 6	181	4 3	34 0
Leeds - -	—	—	—	79	3 9	30 0	216	4 3¾	34 6
Liverpool - -	175	3 4¼	26 10	527	3 9	30 0	2,909	4 2	33 4
London - -	12	3 9¼	30 2	516	4 3¾	34 6	919	4 11¼	39 6
Newcastle - -	—	—	—	396	4 0½	32 4	207	4 9¼	38 2
Shrewsbury -	120	3 3¼	26 2	204	3 11	31 4	96	4 4¼	34 10
Aberdeen - -	1,427	3 2½	25 8	2,145	4 3¼	34 2	2,717	4 6¾	36 6
Dundee - -	494	3 1½	25 0	1,276	4 3¼	34 2	526	4 8¾	37 10
Edinburgh -	—	—	—	4,185	4 3½	34 4	117	4 10½	39 0
Falkirk - -	345	3 9¼	30 2	370	4 2¾	33 10	208	4 7	36 8
Glasgow - -	382	4 1¾	33 2	682	4 2¼	33 6	1,892	4 5½	35 8
Perth - -	3	4 2	33 4	136	4 5½	35 8	124	4 10¼	38 10

V.—*Comparative Statement of the Prices of* FAT CATTLE *in the* FOURTH QUARTERS *of* **1901** *and* **1900.**

PLACES.	INFERIOR or Third Quality.		GOOD or Second Quality.		PRIME or First Quality.	
	1901.	1900.	1901.	1900.	1901.	1900.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d*
Carlisle - -	27 8	27 10	30 8	31 4	35 0	35 2
Leicester - -	27 10	—	30 6	29 4	34 0	34 0
Leeds - -	—	29 4	30 0	30 4	34 6	34 8
Liverpool - -	26 10	24 0	30 0	29 8	33 4	34 4
London - -	30 2	—	34 6	34 2	39 6	38 10
Newcastle - -	—	24 0	32 4	32 8	38 2	37 4
Shrewsbury -	26 2	29 0	31 4	32 4	34 10	35 4
Aberdeen - -	25 8	26 4	34 2	35 0	36 6	38 2
Dundee - -	25 0	26 8	34 2	35 2	37 10	38 6
Edinburgh- -	—	32 0	34 4	35 2	39 0	38 4
Falkirk - -	30 2	30 6	33 10	34 2	36 8	36 8
Glasgow - -	33 2	32 6	33 6	33 4	35 8	36 0
Perth - -	33 4	—	35 8	36 0	38 10	33 4

PRICES OF MEAT, CORN, AND DAIRY PRODUCE.

AVERAGE PRICES of DEAD MEAT, per 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the Fourth Quarter of 1901, and during the Months of December, 1901, and January and February, 1902.

(*Compiled from the prices quoted weekly in the "Meat Trades' Journal."*)

DESCRIPTION.	4TH QUARTER 1901.	DECEMBER 1901.	JANUARY 1902.	FEBRUARY 1902.
	s. d. s. d.	*s. d. s. d.*	*s. d. s. d.*	*s. d. s. d.*
BEEF :—				
Scotch, short sides	4 3 to 4 6	4 3 to 4 6	4 3 to 4 6	4 4 to 4 7
„ long sides	3 11 „ 4 2	3 11 „ 4 2	3 11 „ 4 2	4 0 „ 4 3
English	3 7 „ 3 10	3 8 „ 3 11	3 10 „ 4 0	3 10 „ 4 1
Cows and Bulls	2 0 „ 3 2	2 1 „ 3 2	1 10 „ 3 2	2 0 „ 3 3
American Birkenhead killed	3 5 „ 3 9	3 5 „ 3 10	3 8 „ 3 10	3 8 „ 4 0
„ Deptford killed	3 6 „ 3 10	3 8 „ 4 0	3 9 „ 4 0	3 10 „ 4 1
American Refrig. hind-quarters	3 9 „ 4 1	3 10 „ 4 1	3 11 „ 4 2	4 0 „ 4 4
„ „ fore-quarters	2 4 „ 2 7	2 4 „ 2 7	2 6 „ 2 9	2 8 „ 2 11
Australian, Frozen hind-quarters	2 1 „ 2 2	1 11 „ 2 1	2 0 „ 2 2	2 1 „ 2 2
„ „ fore-quarters	1 6 „ 1 7	1 5 „ 1 6	1 6 „ 1 7	1 10 , —
New Zealand „ hind-quarters	2 7 „ 2 8	2 8 „ 2 9	2 10 „ 2 11	3 2 „ —
„ „ fore-quarters	1 9 „ 1 10	1 10 „ —	1 9 „ 1 10	2 3 „ 2 4
River Plate „ hind-quarters	2 4 „ 2 6	2 3 „ 2 5	2 1 „ 2 5	2 3 „ 2 5
„ „ fore-quarters	1 8 „ 1 9	1 8 „ 1 9	1 8 „ 1 9	1 11 „ —
MUTTON :—				
Scotch, Prime	4 2 „ 4 7	4 0 „ 4 6	3 11 „ 4 5	3 11 „ 4 5
English, Prime	3 10 „ 4 4	3 9 „ 4 5	3 9 „ 4 4	3 9 „ 4 4
Ewes	2 9 „ 3 3	2 8 „ 3 3	2 8 „ 3 3	2 10 „ 3 4
Continental	3 6 „ 3 11	3 5 „ 3 10	3 8 „ 4 1	3 8 „ 4 0
New Zealand, Frozen	1 10 „ 2 7	1 9 „ 2 5	1 11 „ 2 6	1 11 „ 2 7
Australian, Frozen	1 11 „ 2 0	1 9 „ 1 10	2 0 „ 2 1	1 11 „ 2 1
River Plate, Frozen	2 0 „ 2 2	1 10 „ —	2 0 „ 2 2	2 0 „ 2 2
LAMB :—				
English	— —	— —	— —	— —
New Zealand, Frozen	2 10 „ 3 2	3 2 „ 3 3	3 2 „ 3 5	3 9 „ 4 0
VEAL :—				
English	4 5 „ 4 9	4 8 „ 5 0	4 7 „ 4 11	4 9 „ 5 3
Foreign	3 4 „ 4 2	3 7 „ 4 5	3 7 „ 4 5	3 11 „ 4 6
PORK :—				
English, best	4 6 5 0	4 5 „ 4 11	4 1 „ 4 7	4 3 „ 4 7
„ secondary } Foreign }	3 7 „ 4 2	3 6 „ 4 0	3 6 , 3 10	3 6 „ 3 11

AVERAGE PRICES OF DEAD MEAT, per 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the Years 1897 to 1901 inclusive.

(Compiled from the prices quoted weekly in the "Meat Trades Journal.")

DESCRIPTION.	1897.	1898.	1899.	1900.	1901.
BEEF :—	*s. d. s. d.*	*s. d. s. d.*	*s. d. s. d.*	*s. d. s. d.*	*s. d. s. d.*
Scotch, short sides - -	4 2 to 4 5	3 11 to 4 3	4 3 to 4 6	4 5 to 4 8	4 2 to 4 5
,, long sides - -	3 10 ,, 4 1	3 8 ,, 3 10	3 11 ,, 4 1	4 0 ,, 4 3	3 11 ,, 4 1
English - - - - -	3 8 ,, 3 10	3 6 ,, 3 8	3 9 ,, 3 11	3 10 ,, 4 0	3 9 ,, 3 11
Cows and Bulls - -	2 1 ,, 2 11	2 0 ,, 2 8	2 0 ,, 2 10	2 1 ,, 3 2	2 1 ,, 3 2
American, Birkenh'd killed	3 3 ,, 3 6	3 1 ,, 3 5	3 5 ,, 3 8	3 8 ,, 3 10	3 6 ,, 3 9
,, Deptford killed	3 3 ,, 3 6	3 2 ,, 3 5	3 6 ,, 3 9	3 8 ,, 3 11	3 7 ,, 3 10
American Refrig. hind-qrs	3 6 ,, 3 9	3 6 ,, 3 9	3 7 ,, 3 10	3 10 ,, 4 0	3 8 ,, 3 10
,, ,, fore-qrs.	2 3 ,, 2 5	2 2 ,, 2 5	2 4 ,, 2 6	2 8 ,, 2 10	2 4 ,, 2 7
Australian, Froz'n hind-qrs	2 1 ,, 2 3	1 11 ,, 2 1	2 1 ,, 2 4	2 5 ,, 2 7	2 3 ,, 2 4
,, ,, fore-qrs	1 7 ,, 1 9	1 6 ,, 1 8	1 8 ,, 1 9	2 1 ,, 2 2	1 9 ,, —
New Zealand, hind-qrs. -	— —	2 2 ,, 2 4	2 3 ,, 2 6	2 7 ,, 2 9	2 6 ,, 2 7
,, ,, fore-qrs. -	— —	1 8 ,, 1 10	1 9 ,, 1 11	2 2 ,, 2 3	1 10 ,, 1 11
MUTTON :—					
Scotch, Prime - - -	4 4 ,, 4 10	4 1 ,, 4 8	4 5 ,, 4 11	4 9 ,, 5 2	4 6 ,, 4 10
English, Prime - -	4 2 ,, 4 7	3 10 ,, 4 5	4 2 ,, 4 8	4 6 ,, 4 11	4 2 ,, 4 8
Ewes - - - - -	3 1 ,, 3 6	2 9 ,, 3 3	3 1 ,, 3 6	3 4 ,, 3 9	3 3 ,, 3 8
Continental - - -	3 9 ,, 4 1	3 7 ,, 3 11	3 9 ,, 4 2	4 1 ,, 4 6	3 11 ,, 4 4
New Zealand, Frozen -	1 10 ,, 2 4	1 9 ,, 2 6	1 11 ,, 2 8	2 4 ,, 2 9	2 1 ,, 2 10
Australian, Frozen - -	1 7 ,, 1 9	1 8 ,, 1 10	1 10 ,, 2 0	2 3 ,, 2 4	1 11 ,, 2 1
River Plate, Frozen -	1 7 ,, 1 9	1 8 ,, 1 9	1 11 ,, 2 0	2 3 ,, 2 5	2 1 ,, 2 2
LAMB :—					
English - - - -	5 4 ,, 6 2	4 10 ,, 5 9	5 0 ,, 6 2	5 6 ,, 6 4	5 6 ,, 6 5
New Zealand, Frozen -	2 9 ,, 3 1	3 1 ,, 3 5	2 11 ,, 3 3	3 1 ,, 3 5	3 3 ,, 3 8
VEAL —					
English - . - -	3 11 ,, 4 6	4 2 ,, 4 7	4 4 ,, 4 9	4 4 ,, 4 9	4 6 ,, 4 10
Foreign - - - -	3 4 ,, 3 10	3 7 ,, 4 0	3 8 ,, 4 2	3 10 ,, 4 3	3 7 ,, 4 4
PORK :—					
English, best - - -	3 10 ,, 4 2	3 11 ,, 4 3	3 6 ,, 3 11	3 10 ,, 4 2	4 3 ,, 4 8
,, secondary } Foreign - - - }	3 2 ,, 3 7	3 5 ,, 3 10	3 0 ,, 3 5	3 4 ,, 3 9	3 7 ,, 4 0

AVERAGE WHOLESALE PRICES of CATTLE and SHEEP, per 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during each Quarter of 1901, with the Mean Prices for the year.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
1st Quarter, 1901	2 4	3 11	4 7	3 4	5 2	6 0
2nd Quarter, ,,	2 4	3 11	4 6	3 3	4 9	5 7
3rd Quarter, ,,	2 4	4 0	4 7	3 2	4 9	5 7
4th Quarter, ,,	2 5	4 0	4 9	3 2	4 10	5 7
Year - - -	2 4	3 11	4 7	3 3	4 10	5 8

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during each Quarter of 1901, with the Mean Prices for the year.

PERIOD.	LIVERPOOL.*		GLASGOW.†	
	BEEF.	MUTTON.	BEEF.	MUTTON.
	s. d. s. d.	*s. d. s. d.*	*s. d. s. d.*	*s. d. s. d.*
1st Quarter, 1901	2 8 to 3 11	3 6 to 5 4	3 0 to 3 10	4 4 to 5 4
2nd Quarter, ,,	2 10 ,, 3 8	4 8 ,, 5 8	3 4 ,, 3 10	4 2 ,, 5 2
3rd Quarter, ,,	3 0 ,, 3 11	3 8 ,, 5 0	3 0 ,, 3 10	3 8 ,, 4 8
4th Quarter, ,,	2 4 ,, 4 0	3 4 ,, 4 10	3 0 ,, 3 10	3 0 ,, 4 4
Year - - -	2 8 ,, 3 10	3 9 ,, 5 2	3 1 ,, 3 10	3 9 ,, 4 10

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals *slaughtered at the Liverpool Abattoir*, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College, Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Dead Weight) in the BERLIN CATTLE MARKET in the under-mentioned Months of 1901 and 1902.

MONTHS.	CATTLE.		SHEEP.		SWINE.	
	Per Cwt.		Per Cwt.		Per Cwt.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
November, 1901 - -	59	8	59	2	62	1
December, 1901 - -	59	2	56	6	60	10
January, 1902 - -	58	10	54	0	60	7

NOTE.—The above prices are compiled from the Wholesale Prices quoted in the *Monatliche Nachweise über den Auswärtigen Handel des deutschen Zollgebiets.* The prices for swine are live weight prices with 20 per cent. tare.

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality) in the PARIS CATTLE MARKET in the under-mentioned Months of 1901 and 1902, together with the mean prices for year 1901.

MONTHS.	OXEN.		CALVES.		SHEEP.		PIGS.	
	Per Cwt.		Per Cwt.		Per Cwt.		Per Cwt.	
LIVE WEIGHT.								
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
December, 1901 - -	27	8	44	0	36	2	32	2
Mean of the Year, 1901 -	29	3	44	1	35	1	35	0
DEAD WEIGHT.								
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
December, 1901 - -	46	8	73	7	72	6	45	7
Mean of the Year 1901 -	48	11	73	8	70	2	49	10
January, 1902 - -	49	8	71	8	68	0	53	2
February, 1902 - -	48	4	71	3	69	3	56	9

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique.*

CHICAGO.

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1901 and 1902, with the Mean Prices for the Year 1901.

Month.	Good Dressed Beef and Shipping Steers.					Export Cattle.					Extra Prime Cattle.				
	s.	d.		s.	d.	s.	d.		s.	d.	s.	d.		s.	d.
December, 1901 -	25	5	to	32	1	26	11	to	33	3	34	3	to	35	6
Mean of the year 1901 -	24	1	,,	27	9	24	4	,,	28	10	29	5	,,	30	5
January, 1902 -	26	7	,,	34	0	27	5	,,	34	4	35	6	,,	36	8
February, ,, -	25	11	,,	31	9	26	6	,,	33	4	34	0	,,	35	2

Compiled from the Live Stock Reports issued by Messrs. Clay, Robinson, and Co., of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in each Quarter of 1901, with the Average Values for the Year.

(*Computed from the Trade and Navigation Accounts.*)

PERIOD.	BEEF. Fresh.		BEEF. Salted.		MUTTON. Fresh.		PORK. Fresh.		PORK. Salted.		BACON.		HAMS.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
1st Quarter, 1901 -	40	9	25	8	37	9	43	2	27	10	45	1	46	8
2nd Quarter, ,, -	39	5	25	10	36	6	43	8	25	7	47	3	47	7
3rd Quarter, ,, -	39	4	26	3	37	2	43	5	24	4	46	9	49	11
4th Quarter ,, -	38	9	27	1	34	11	43	4	27	7	49	3	50	2
Year - - - -	39	6	26	2	36	7	43	4	26	3	47	1	48	8

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1901, 1900, and 1899.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1901.	1900.	1899.	1901.	1900.	1899.
Wheat.						
	s. d.	*s. d.*	*s. d.*	*Quarters.*	*Quarters.*	*Quarters.*
Lady Day - - - -	26 3	25 11	26 3	744,018	868,378	868,579
Midsummer - - - -	27 1	25 9	25 1	547,737	854,497	994,293
Michaelmas - - - -	26 11	28 7	25 2	535,109	511,347	754,667
Christmas - - - -	26 7	27 4	26 4	778,686	689,261	913,421
Barley.						
	s. d.	*s. d.*	*s. d.*	*Quarters.*	*Quarters.*	*Quarters.*
Lady Day - - - -	25 3	25 1	27 1	844,616	888,949	830 398
Midsummer - - - -	24 9	24 3	24 6	53,408	93,157	92,648
Michaelmas - - - -	24 0	24 5	24 4	236,164	143,552	237,935
Christmas - - - -	26 8	25 11	26 6	2,235,441	2,065,135	2,135 762
Oats.						
	s. d.	*s. d.*	*s. d.*	*Quarters.*	*Quarters.*	*Quarters.*
Lady Day - - - -	17 6	16 7	16 11	236,316	246,949	251,841
Midsummer - - - -	19 3	18 2	17 6	81,172	110,163	137,834
Michaelmas - - - -	18 7	18 7	17 3	131 023	116 880	147,902
Christmas - - - -	18 4	17 0	16 4	265,703	237,791	238,783

* Section 8 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local inspector of Corn Returns in any other measure than the imperial bushel or by weight or by a weighed measure, that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 39 imperial pounds for every bushel of oats.

CORN PRICES :—ANNUAL AVERAGES.

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Weekly Averages of Corn Returns from the Returning Markets, together with the QUANTITIES returned as sold at such Markets during each of the years 1897 to 1901.

YEARS.	PRICES.			QUANTITIES.		
	Wheat.	Barley.	Oats.	Wheat.	Barley.	Oats.
	s. d.	*s. d.*	*s. d.*	*Quarters.*	*Quarters.*	*Quarters.*
1897 - - -	30 2	23 6	16 11	2,756,561	3,257,187	550,434
1898 - - -	34 0	27 2	18 5	2,602,416	3,653,657	688,064
1899 - - -	25 8	25 7	17 0	3,530,961	3,296,744	776,361
1900 - - -	26 11	24 11	17 7	2,923,483	3,190,793	711,784
1901 - - -	26 9	25 2	18 5	2,605,550	3,369,629	714,215

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1902, and in the corresponding Weeks in 1901 and 1900.

Weeks ended (*in 1902*).	**Wheat.**			**Barley.**			**Oats.**		
	1902.	1901.	1900.	1902.	1901.	1900.	1902.	1901.	1900.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Jan. 4 -	27 7	26 5	25 9	26 7	25 4	25 7	19 10	17 2	16 2
,, 11 -	27 8	26 7	25 11	26 7	25 6	25 5	20 0	17 3	16 3
,, 18 -	27 8	26 11	26 0	26 11	25 9	25 8	20 0	17 3	16 2
,, 25 -	27 7	26 10	25 10	26 7	25 6	25 9	20 3	17 6	16 4
Feb. 1 -	27 4	26 7	25 8	26 7	25 7	25 4	20 2	17 8	16 6
,, 8 -	27 2	26 8	25 10	26 9	25 7	25 3	20 3	17 7	16 5
,, 15 -	26 11	26 4	26 1	27 5	25 4	24 11	20 3	17 7	16 8
,, 22 -	27 1	26 1	26 3	26 11	25 0	25 1	20 4	17 7	16 9
Mar. 1 -	27 1	25 11	26 4	26 8	25 0	24 6	20 5	17 9	16 10
,, 8 -	27 0	25 9	25 11	26 8	25 4	24 8	20 5	17 7	16 11
,, 15 -	27 1	25 9	25 10	26 6	25 1	24 6	20 6	17 7	16 11
,, 22 -		25 8	25 11		24 11	25 0		17 9	17 1
,, 29 -		26 0	25 10		24 9	24 11		18 0	17 2
Apl. 5 -		26 3	25 10		25 3	24 10		18 0	17 2
,, 12 -		26 5	25 11		26 0	24 5		18 1	17 8
,, 19 -		26 8	26 0		25 7	24 9		18 8	17 3
,, 26 -		26 8	26 0		25 8	25 2		18 8	17 11
May 3 -		26 9	25 11		26 4	25 3		19 1	18 0
,, 10 -		27 3	25 11		26 2	24 10		19 1	17 11
,, 17 -		27 7	25 7		24 2	24 5		19 4	18 5
,, 24 -		27 7	25 5		24 1	23 11		19 8	18 2
,, 31 -		27 7	25 5		23 8	24 4		19 9	18 6
June 7 -		27 6	25 3		22 9	23 8		20 1	18 8
,, 14 -		27 8	25 6		24 0	23 8		19 7	18 11
,, 21 -		27 6	25 9		23 2	23 5		20 3	18 11
,, 28 -		27 6	26 11		25 4	23 4		20 0	19 3
July 5 -		27 8	27 10		21 9	22 10		19 10	19 5
,, 12 -		27 2	28 7		23 10	23 2		19 9	19 1
,, 19 -		27 3	29 0		23 4	23 8		19 11	19 3
,, 26 -		27 3	29 3		22 1	24 4		19 4	19 9
Aug. 2 -		27 6	28 10		23 1	23 10		20 0	19 4
,, 9 -		27 7	28 7		22 1	23 7		19 4	19 8
,, 16 -		27 4	28 10		27 2	23 3		18 9	19 11
,, 23 -		27 3	28 10		23 7	24 10		18 1	18 8
,, 30 -		27 0	28 8		24 3	25 2		17 10	18 1
Sept. 6 -		26 5	28 7		25 1	25 8		17 6	17 10
,, 13 -		26 2	28 4		24 11	25 4		17 4	17 1
,, 20 -		26 0	28 4		25 5	26 0		17 4	17 1
,, 27 -		25 10	28 9		25 10	26 1		17 2	17 2
Oct. 4 -		25 8	28 9		26 3	26 2		17 7	16 10
,, 11 -		25 9	28 9		26 5	26 2		17 6	17 1
,, 18 -		25 10	28 4		26 8	26 5		17 8	16 11
,, 25 -		25 11	27 11		26 10	26 3		17 5	16 11
Nov. 1 -		26 2	27 5		26 10	26 3		17 7	16 11
,, 8 -		26 6	27 3		27 0	25 11		17 8	16 10
,, 15 -		26 9	27 1		26 9	25 8		18 3	17 1
,, 22 -		27 1	27 2		26 10	25 10		18 7	17 0
,, 29 -		27 1	27 0		26 9	25 9		18 9	17 2
Dec. 6 -		27 1	26 10		26 7	25 11		19 0	17 4
,, 13 -		27 2	26 9		26 8	25 7		19 3	17 1
,, 20 -		27 7	26 7		26 8	25 7		19 8	17 2
,, 27 -		27 7	26 4		26 8	25 10		19 10	17 2

AVERAGE VALUE per IMPERIAL QUARTER OF WHEAT IMPORTED into the UNITED KINGDOM from the under-mentioned Foreign Countries and British Possessions in the years 1899, 1900, and 1901.

COUNTRIES from which Exported.	Average Value per Imperial Quarter.		
	1899.	1900.	1901.
	s. d.	s. d.	s. d.
ARGENTINE REPUBLIC	27 4	28 2	2 4
CHILE	27 5	29 9	—
GERMANY	28 0	28 1	29 11
ROUMANIA	29 6	29 9	26 7
RUSSIA	28 8	29 3	28 2
TURKEY	25 6	27 10	25 1
U.S. OF AMERICA { Atlantic	29 4	29 9	28 6
U.S. OF AMERICA { Pacific	28 7	29 1	28 7
INDIA, BRITISH	27 9	29 11	26 7
NORTH AMERICA, BRITISH	29 5	29 10	28 4
AUSTRALIA	29 1	30 3	29 0
NEW ZEALAND	28 1	28 7	27 10

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES, in the under-mentioned Months of 1901 and 1902.

MONTH.	FRANCE.	ENGLAND.
WHEAT.		
	Per Qr. s. d.	Per Qr. s. d.
December, 1901	35 11	27 4
January, 1902	36 5	27 7
February, „	36 7	27 1
BARLEY.		
	Per Qr. s. d.	Per Qr. s. d.
December, 1901	23 0	26 7
January, 1902	23 2	26 8
February, „	23 3	26 11
OATS.		
	Per Qr. s. d.	Per Qr. s. d.
December, 1901	22 3	19 5
January, 1902	22 8	20 0
February, „	23 0	20 3

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*. The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

AVERAGE PRICES of WHEAT, BARLEY, and OATS, per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1901 and 1902, with Mean Prices for the year 1901.

Month.	Wheat.		Barley.		Oats.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
September, 1901 - - - -	27	3	22	3	18	8
October, ,, - - - -	27	7	22	8	19	3
November, ,, - - - -	28	0	22	11	19	6
December, ,, - - - -	28	5	23	2	20	1
Mean of the year 1901 - -	28	6	22	8	19	4
January, 1902 - - - -	28	4	23	2	20	5

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge.*

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER at LONDON, PARIS and BERLIN in the under-mentioned Months of 1901 and 1902, with the Mean Prices for the Year 1901.

Month.	London.		Paris.		Berlin.	
			WHEAT.			
	Per Qr.		Per Qr.		Per Qr.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
November, 1901 - - - -	27	6	36	8	35	7
December, ,, - - - -	28	0	37	9	37	4
Mean of the year 1901 - -	27	7	35	3	—	
January, 1902 - - - -	27	9	38	0	37	5
February, ,, - - - -	28	0	37	4	—	
			BARLEY.			
	Per Qr.		Per Qr.		Per Qr.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
November, 1901 - - - -	29	6	22	11	23	2*
December, ,, - - - -	29	0	23	2	23	0*
Mean of the year 1901 - -	27	8	22	10	—	
January, 1902 - - - -	29	2	23	3	22	10*
February, ,, - - - -	29	6	23	8	—	
			OATS.			
	Per Qr.		Per Qr.		Per Qr.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
November, 1901 - - - -	19	2	23	1	20	11
December, ,, - - - -	20	6	24	3	21	8
Mean of the year 1901 - -	19	0	22	5	—	
January, 1902 - - - -	20	10	24	5	21	10
February, ,, - - - -	21	0	24	8	—	

Note.—The London quotations represent the price of British corn as returned under the Corn Returns Act, 1882; the prices of grain in Paris have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the quotations for Berlin are the average prices published monthly in the *Monatliche Nachweise über den Auswärtigen Handel des deutschen Zollgebiets.*

* Prices at Breslau; no quotations for Berlin.

MEAN WHOLESALE PRICES of BUTTER, MARGARINE, and CHEESE in the under-mentioned Months of 1901 and 1902.
(Compiled from the *Grocer.*)

DESCRIPTION.	December, 1901.				January, 1902.				February, 1902.			
	Per Cwt.				Per Cwt.				Per Cwt.			
BUTTER:	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Cork, 1sts - -	106	6	—		118	0	—		117	0	—	
,, 2nds - -	96	0	—		99	0	—		99	0	—	
,, 3rds - -	85	0	—		88	6	—		91	0	—	
,, 4ths - -	73	6	—		74	0	—		67	0	—	
Irish Creamery * -	112	0 to	116	6	108	0 to	111	6	111	0 to	115	0
Friesland - -	107	0 ,,	110	0	106	6 ,,	109	0	110	0 ,,	112	0
Dutch Creameries -	110	0 ,,	112	0	108	6 ,,	111	0	112	0 ,,	113	0
French Baskets -	106	0 ,,	114	0	108	0 ,,	115	0	111	0 ,,	117	0
,, Crocks and Firkins -	96	0 ,,	102	0	98	0 ,,	104	0	101	0 ,,	107	0
,, 2nds and 3rds	80	0 ,,	92	0	82	0 ,,	94	0	85	0 ,,	97	0
Danish and Swedish -	114	6 ,,	118	0	108	6 ,,	113	0	112	6 ,,	116	0
Finnish - -	100	0 ,,	106	6	99	6 ,,	105	6	102	6 ,,	108	6
Russian and Siberian	71	0 ,,	101	6	77	6 ,,	99	0	90	6 ,,	102	0
Argentine - -	108	0 ,,	111	6	106	0 ,,	109	0	108	6 ,,	111	0
Canadian and States -	73	6 ,,	100	0	79	0 ,,	100	0	88	0 ,,	103	0
Colonial, fine- -	98	0 ,,	108	0	98	0 ,,	108	0	100	6 ,,	111	6
,, good and inferior -	71	6 ,,	93	6	73	6 ,,	94	0	78	0 ,,	96	6
Fresh Rolls (Foreign) per doz. - -	11	0 ,,	15	0	11	0 ,,	15	6	11	0 ,,	16	0
MARGARINE - -	36	0 ,,	58	0	36	0 ,,	58	0	37	0 ,,	59	0
CHEESE:												
Cheddar -	56	0 ,,	72	0	56	0 ,,	72	0	56	0 ,,	72	0
,, Loaf -	64	0 ,,	68	0	65	6 ,,	69	0	70	0 ,,	72	0
Wiltshire, Loaf -	68	0 ,,	70	0	68	0 ,,	70	6	68	0 ,,	72	0
Double Gloucester -	56	0 ,,	58	0	56	0 ,,	58	0	56	0 ,,	58	0
Derby, Factory -	60	0 ,,	62	0	61	0 ,,	62	6	63	0 ,,	64	0

* These prices are the averages of the official quotations of the Price Committee of the Irish Co-operative Agency at Limerick for the choicest Irish pure creamery butter

WEEKLY PRICES (WHOLESALE) of VEGETABLES and FRUIT at COVENT GARDEN MARKET in each week of February, 1902.

(Compiled from the *Gardeners' Chronicle.*)

Description.	Week ending February 1st.	Week ending February 8th.	Week ending February 15th.	Week ending February 22nd.
VEGETABLES—	*s. d.* *s. d.*	*s. d.* *s. d.*	*s. d.* *s. d.*	*s. d.* *s. d.*
Artichokes, Globe, per doz.	3 0 to 3 6	3 0 to 3 6	3 0 to 3 6	3 0 —
,, Jerusalem, per sieve	1 0 ,, 1 6	1 0 ,, 1 6	1 0 ,, 1 6	1 0 to 1 6
Asparagus, English, per bundle	7 0 —	8 0 —	9 0 ,, 10 0	7 0 ,, 8 0
Beans, Dwarf, house, per lb.	2 6 ,, 3 0	2 6 ,, 3 0	2 6 ,, 3 0	2 9 ,, 3 0
Beetroots, new, per bushel	1 3 ,, 1 6	1 3 ,, 1 6	1 3 ,, 1 6	1 3 ,, 1 6
Brussels Sprouts, sieve	1 6 ,, 2 0	1 9 ,, 2 3	2 0 ,, 2 6	2 0 ,, 2 6
Cabbage, tally	4 0 ,, —	4 0 —	5 0 —	— —
,, per dozen	0 9 ,, 1 0	0 9 ,, 1 0	0 9 ,, 1 0	— —
Carrots, per dozen bunches	2 6 ,, 3 0	3 0 ,, 3 6	3 0 ,, 3 6	3 0 ,, 3 6
,, washed, bags	2 6 ,, 3 6	2 6 ,, 3 6	2 6 ,, 3 6	3 0 ,, 3 6
,, unwashed, bags	2 0 ,, —	2 0 ,, —	2 0 —	2 0 ,, 2 6
Cauliflowers, per dozen	2 0 ,, 2 6	3 0 —	3 0 —	3 0 —
,, per tally	5 0 ,, 10 0	5 0 ,, 10 0	5 0 ,, 10 0	5 0 ,, 10 0
Celery, 12 bundles	10 0 ,, 16 0	10 0 ,, 16 0	10 0 ,, 16 0	10 0 ,, 12 0
Cress, per dozen punnets	1 3 —	1 3 —	1 3 —	1 3 —
Cucumbers, per dozen	10 0 ,, 19 0	10 0 ,, 19 0	6 0 ,, 12 0	6 0 ,, 10 0
Endive, new French, per dozen	1 6 ,, 1 9	2 0 ,, 2 6	2 0 ,, 2 6	1 9 —
Garlick, per lb.	0 3 ,, —	0 3 —	0 3 —	0 3 —
Horseradish, foreign, bunch	1 0 ,, 1 6	1 0 ,, 1 6	1 0 ,, 1 6	1 0 ,, 1 6
Leeks, per 12 bunches	1 6 —	2 0 —	2 0 —	2 6 ,, 3 0
Lettuces, Cabbage, per dozen	1 4 —	0 9 ,, 1 6	0 10 ,, 1 3	— —
Onions, cases	8 0 ,, 8 6	8 0 ,, 8 6	8 0 ,, 8 6	10 6 —
,, English, per cwt.	7 0 ,, 7 6	7 0 ,, 7 6	7 0 ,, 7 6	7 6 ,, 8 6
,, in bags	5 6 ,, 6 0	5 6 ,, 6 0	5 6 ,, 6 0	7 0 ,, 7 6
,, picklers, sieve	2 0 ,, 3 0	2 0 ,, 3 0	2 0 ,, 3 0	2 0 ,, 3 0
Parsley, per dozen bunches	1 6 ,, 2 0	1 6 ,, 2 0	1 6 ,, 2 0	2 0 —
,, sieve	2 0 —	4 0 —	4 0 —	1 6 —
Parsnips, per cwt. bag	2 6 ,, 3 3	2 6 ,, 3 3	2 6 ,, 3 3	2 6 ,, 3 3
Potatoes, per ton	50 0 ,, 90 0	50 0 ,, 90 0	50 0 ,, 90 0	50 0 ,, 90 0
,, new, per lb.	0 3 ,, 0 4	0 3½ ,, 0 4	0 3½ ,, 0 4	0 3 —
Radishes, per doz. bunches	0 9 ,, 1 9	0 9 ,, 1 9	1 0 ,, 1 6	1 6 —
Salad, small, punnets, doz.	1 3 —	1 3 —	1 3 —	1 3 —
Savoys, tally	3 0 ,, 8 0	3 0 ,, 8 0	3 0 ,, 8 0	3 0 ,, 8 0
Spinach, English, bushel	1 9 ,, 2 0	4 0 —	4 0 —	3 6 ,, 4 0
Turnips, per dozen bunches	1 6 ,, 2 0	2 0 ,, 2 6	2 6 ,, 3 0	2 6 ,, 3 0
,, bag	1 6 ,, 2 6	1 6 ,, 2 0	1 6 ,, 2 6	1 6 ,, 2 6
Watercress, per dozen bunches	0 6 ,, 0 8	0 6 ,, 0 8	0 6 ,, 0 8	0 6 —
FRUIT—				
Apples, home grown, bushel	6 0 ,, 10 0	6 0 ,, 10 0	6 0 ,, 10 0	6 0 ,, 10 0
,, Blenheims, etc, bushel	5 0 ,, 8 0	5 0 ,, 8 0	5 0 ,, 8 0	— —
,, King Pippins, bushel	5 0 ,, 7 0	5 0 ,, 7 0	5 0 ,, 7 0	— —
,, Large Cookers, bushel	13 0 —	13 0 —	13 0 —	7 0 ,, 8 0
,, Nova Scotian, barrel	21 0 ,, 26 0	21 0 ,, 26 0	21 0 ,, 26 0	21 0 ,, 30 0
Chestnuts, per bag	7 0 ,, 14 0	7 0 ,, 14 0	7 0 ,, 14 0	12 0 ,, 13 0
Cobnuts, Kentish, per lb.	0 10 ,, —	0 11 ,, 1 0	0 11 ,, 1 0	0 11 ,, 1 0
Cranberries, per case	9 0 ,, 10 6	9 0 ,, 10 6	9 0 ,, 10 6	12 6 —
Grapes, Gros Colmar, A., per lb.	1 6 ,, 2 0	2 0 ,, 2 6	2 6 ,, 3 0	3 0 ,, 4 0
,, ,, ,, B., per lb.	0 10 ,, 1 3	1 6 —	1 6 ,, 1 9	1 6 ,, 2 0
,, Alicante, per lb.	1 3 ,, 2 0	1 3 ,, 2 0	1 3 ,, 2 0	1 6 ,, 2 6
,, Almeiara, per doz lb.	5 0 ,, 6 0	5 0 ,, 6 0	5 0 ,, 6 0	5 0 ,, 8 0
Pines, each	1 9 ,, 3 3	1 9 ,, 3 3	1 9 ,, 3 3	2 0 ,, 3 0
Walnuts, per bag	3 0 ,, 4 0	3 0 ,, 4 0	3 0 ,, 4 0	3 0 —

DISEASES OF ANIMALS IN GREAT BRITAIN.

NUMBER of OUTBREAKS of **Foot-and-Mouth Disease** and of **Swine-Fever**, with the Number of SWINE Slaughtered by order of the Board of Agriculture, in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Foot-and-Mouth Disease.		Swine-Fever.	
	OUTBREAKS Confirmed.	ANIMALS Attacked.	OUTBREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	*No.*	*No.*	*No.*
June, 1900	2	24	736	7,600
September, 1900	7	102	409	2,622
December, 1900	5	41	357	2,731
March, 1901	10	652	625	3,165
June, 1901	2	17	1,490	7,066
September, 1901	—	—	680	3,391
December, 1901	—	—	345	1,615

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax** and **Glanders** in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including **Farcy**).	
	OUTBREAKS Reported.	ANIMALS Attacked.	OUTBREAKS Reported.	ANIMALS Attacked.
	No.	*No.*	*No.*	*No.*
June, 1900	163	279	286	461
September, 1900	109	224	315	474
December, 1900	159	240	259	437
March, 1901	163	223	322	571
June, 1901	193	281	327	551
September, 1901	114	165	398	677
December, 1901	181	302	300	571

NUMBER OF CASES of **Rabies** in DOGS in GREAT BRITAIN in each of the under-mentioned periods.

THREE MONTHS ENDED	Number of Cases.
30th June, 1900	—
30th September, 1900	3
31st December, 1900	3
31st March, 1901	1
30th June, 1901	—
30th September 1901	—
31st December, 1901	—

DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Department of Agriculture and Technical Instruction in IRELAND, in each of the undermentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUT-BREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUT-BREAKS Con-firmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	*No.*	*No.*	*No.*	*No.*
June, 1900	—	—	—	78	1,394
September, 1900	—	—	—	69	1,036
December, 1900	—	—	—	39	577
March, 1901	—	—	—	64	1,265
June, 1901	—	—	—	67	1,242
September, 1901	—	—	—	72	1,089
December, 1901	—	—	—	24	436

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax**, **Glanders**, and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including **Farcy**).		Rabies.	
					CASES REPORTED.	
	OUT-BREAKS REPORTED.	ANIMALS ATTACKED.	OUT-BREAKS REPORTED.	ANIMALS ATTACKED.	DOGS.	OTHER ANIMALS.
	No.	*No.*	*No.*	*No.*	*No.*	*No.*
June, 1900	1	1	3	7	4	1
September, 1900	—	—	1	1	1	—
December, 1900	—	—	2	2	5	1
March, 1901	—	—	1	1	1	—
June, 1901	1	2	3	3	—	1
September, 1901	—	—	—	—	—	—
December, 1901	1	2	1	2	—	—

PRICES OF WOOL.

AVERAGE PRICES of ENGLISH WOOL, per pack of 240 lbs., in the under-mentioned Months of 1901 and 1902.

(*Compiled from the Economist.*)

DESCRIPTION.	December, 1901.	January, 1902.	Feburary, 1902.
	£ s. £ s.	£ s. £ s.	£ s. £ s.
South Down -	7 0 to 8 10	7 0 to 8 10	7 0 to 8 10
Half-breds - - -	5 0 ,, 6 10	5 0 ,, 6 10	5 0 ,, 6 10
Leicester - - -	5 0 ,, 5 10	5 0 ,, 5 10	5 0 ,, 5 10
Kent Fleeces - -	5 0 ,, 6 0	5 0 ,, 6 0	5 0 ,, 6 0

ORDNANCE SURVEY MAPS OF GREAT BRITAIN AND IRELAND.

The Ordnance Survey are issuing a new series of folding pocket maps for England and Wales on the scale of one inch to the mile. The maps are printed in colours on sheets 18 by 12 inches, mounted on canvas, in a cover or flat, price 1s. each. The one-inch map can also be procured at the same price in black and white, showing outline and contours; or in outline, with hills printed either in black or brown: the outline map has recently been revised. These maps are not only useful for general topographical purposes, but should also prove serviceable to cyclists and pedestrians, since they show all roads, indicating their character and whether metalled or not, footpaths, hills, rivers, towns, villages, railway stations, and loca boundaries.

Combined one-inch outline maps have also been published for a number of districts.

These combined maps are based on the revised one-inch map. In most cases they are being published folded in covers, and with the principal roads coloured, at prices varying from 1s. to 1s. 6d.

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There are agents for the sale of Ordnance Survey Maps in most o the chief towns, and maps can be ordered and indexes, etc., seen at many Head Post Offices, in places where there are no agents. They can also be ordered, through any bookseller, from the Director-General, Ordnance Survey, Southampton ; or, in the case of Ireland, from the Officer in Charge, Ordnance Survey, Dublin.

A leaflet describing the various editions of the Ordnance Survey Maps may be obtained, post free and free of charge, from the Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W.

Geological Survey Publications of Great Britain and Ireland.

The Agents for the sale of Ordnance Survey Maps are also, as a rule, agents for the sale of Geological Survey Publications.

THE "BOARD OF TRADE JOURNAL."

The "Board of Trade Journal," now published weekly at the cost of one penny, is the principal medium through which intelligence collected by the Commercial Intelligence Branch of the Board of Trade and intended for general information is conveyed to the public. It contains notices of contracts for tender and other openings for trade abroad ; particulars of changes affecting British trade in foreign and colonial customs tariffs ; special articles on the trade and industries of foreign countries and British possessions ; items of interest under such sectional headings as "Proposed Tariff Change," "Shipping and Transport" (containing port charges and changes, new steamship-lines, trade and rates, &c.) ; "Minerals, Metals and Machinery," &c., and other information likely to be useful to manufacturers and traders. Various statistical tables and reviews of recent Government publications are also included in the contents.

The "Board of Trade Journal" is issued every Thursday morning and single copies may be obtained direct from the publishers, Messrs. Eyre & Spottiswoode, East Harding Street, Fleet Street, E.C., at a cost of 1d., or it may be subscribed for (post free) at the rate of 6/6 per annum for the United Kingdom.

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No.	Title.	No.	Title.
1	Mites on Currant and Nut Trees.	33	Surface Caterpillars.
2	Vine and Raspberry Weevils.	34	The Woolly Aphis or American Blight.
3	The Turnip Fly or Flea.		
4	Caterpillars on Fruit Trees.	35	The Celery Fly.
5	The Mangel Wurzel Fly.	38	The Carrot Fly.
10	Wireworms.	41	The Red Spider or Spinning Mite.
11	The Daddy Longlegs.	46	The Stem Eelworm.
12	The Gooseberry Saw-Fly.	47	The Asparagus Beetle.
14	The Raspberry Moth.	48	The Pea Thrips.
15	The Apple Blossom Weevil.	49	The Fruit Tree Beetle.
16	The Apple Sucker.	52	Gooseberry Blight.
19	Pea and Bean Weevil.	53	The Pear Midge.
20	The Magpie Moth.	56	The Canker Fungus.
21	The Warble Fly.	60	The Wood Leopard Moth.
22	The Diamond Back Moth.	62	Pear and Cherry Saw-Fly.
23	Potato Disease.	64	White Root Rot.
24	The Ribbon Footed Corn-Fly.	65	The Small Ermine Moths.
25	The Cockchafer.	68	Currant Aphides.
30	The Codlin Moth.	69	Tent Caterpillars.
31	The Onion Fly.	70	Winter Washing of Fruit Trees.

(b.) *Leaflets dealing with Birds useful to Agriculture.*

40	The Kestrel or Windhover.	45	The Starling.
42	The Short-Eared Owl.	50	Water Wagtails or "Dishwashers."
43	Titmice.	51	The White or Barn Owl.
44	The Common Lapwing, Plover, or Peewit.	54	The Spotted Flycatcher.
		55	The Swallow.

(c.) *Leaflets dealing with Diseases of Animals.*

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(d.) *Leaflets relating to Acts of Parliament.*

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(e.) *Leaflets dealing with Miscellaneous Subjects.*

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13	Acorn Poisoning.	63	Destruction of Charlock.
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36	Cultivation of Osiers.		

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